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Aggregate Returns to Social Capital:

Estimates Based on the Augmented Augmented-Solow Model

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Abstract

This paper estimates the aggregate output elasticity of social capital that characterizes the aggregate returns to social capital. With this aim, we apply Nonneman and Vanhoudt's (1996) augmented version of the augmented Solow model of Mankiw et al. (1992) by including social capital as an additional production input. The estimated output elasticity of social capital is approximately 0.1. While our results largely indicate that social capital positively affects economic growth, the magnitude of the effects is smaller than that of physical and human capital as well as labor inputs. Moreover, the median value of the implied aggregate return of social capital is approximately 9.77% at the global level and, in OECD countries, it is likely to be considerably smaller than the individual returns, suggesting the fallacy of composition. As a by product, the depreciation rate of social capital is estimated to be approximately 10% per annum which is significantly higher than that of physical capital.

JEL Classification Numbers: E26, O10, O40

Keywords: Social Capital; Economic Growth; The Augmented Solow Model

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1 Introduction

Recently, social capital became a catchword to explain the unobserved heterogeneity in the economic performance of people, communities, and countries [Dasgupta and Serageldin (2000)]. What, then, are the individual and aggregate returns to social capital? Is it even possible to quantify these seemingly intangible returns? On the one hand, estimating individual returns to social capital is made easier by using micro data. There are many reduced-form micro studies that found positive returns to social capital [Durlauf and Fafchamps (2004); Fafchamps and Minten (2002); Narayan and Pritchett (1999)]. However, as Durlauf and Fafchamps (2004) 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, then social capital becomes individually remunerative yet socially unproductive.[1] Olson (1982) pointed that such examples include the formations of trade unions, political parties, and lobbyist groups. Fafchamps (2006) referred to this situation as the fallacy of composition. In contrast, if social capital generates positive externalities that are not entirely appropriated by the owners of social capital, individual returns will underestimate social returns. Accordingly, private returns to social capital from micro-level 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 the 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 implemented carefully. This paper aims to exert such efforts.

While in the existing macro-level literature, Knack and Keefer (1997), Temple and Johnson (1998), Zak and Knack (2001), and Beugelsdijk et al. (2004) found a positive correlation between social capital and economic growth, there is no formal effort to estimate the structural parameters related to the aggregate *returns* to social capital or the *degree* of social capital's contribution to economic growth. There are at least two reasons for the lack of such research. First, this may be due to the fact that the concept of social capital has remained multi-faceted and elusive since Loury (1977) introduced it into modern social science research and Coleman (1988) popularized it in sociology. In general, social capital is understood as the informal forms of institutions and organizations based on social relationships, networks and associations that create shared knowledge, mutual trust, social norms, and unwritten rules [Durlauf and Fafchamps (2004)]. Because the concept of social capital is a bundle of these intangible objects, it may be elusive by nature. A major challenge is to quantify intangible social capital *at the aggregate level* and thereby distinguish it from other types of capital.

Second, while cross-country growth regression studies, namely, the Barro Regression [Barro (1991)],

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

have become a standard method to examine the determinants of economic growth, its reduced-form nature is not suitable for identifying the *structure* of economic growth. The influential works of Knack and Keefer (1997) and Temple and Johnson (1998) also employed a reduced-form growth regression for the role of social capital and thus, do not consider the structural parameters that characterize the aggregate returns to social capital. Moreover, as Durlauf and Fafchamps (2004) argue, it is difficult to estimate a growth equation with an aggregate social capital variable as one of the independent variables because such a variable is correlated with the error term by nature; nonetheless, determining an appropriate instrumental variable is not straightforward.

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 enable them to quantify a social rate of return for technological knowledge. Our basic strategy is to augment MRW's model by including social capital as an additional production input in order to estimate the output elasticity of social capital. By doing so, we can quantify the aggregate returns to social capital as compared with other types of capital.

With regard to the choice of appropriate data for social capital, we confine ourselves to cosider social capital as a source of economic development by improving the social connectivity through information sharing and mutual communications.[2] In particular, we follow Ostrom (2000) that emphasizes the importance of shared knowledge when defining the concept of social capital. 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, the frequency of exchanging letters and electronic mails, the number of radio listeners and televiewers, and so on. We adopt some 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 a standard reduced-form growth regression approach to the role of social capital in economic growth such as that in Knack and Keefer (1997), Temple and Johnson (1998), Helliwell and Putnam (1995), Zak and Knack (2001), and Beugelsdijk et al. (2004), our strategy enables us to estimate the structural parameters associated with aggregate returns to social capital.

To preview our results, there are two important findings that emerge from our empirical analysis. First, 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

[2] Through a comprehensive survey on social capital covering both micro and macro literature, Durlauf and Fafchamps (2004) concluded that mutual communication is one of the most important common components of the different definitions of social capital.

capital as well as labor inputs. In particular, the aggregated returns to social capital appear to be almost negligible for OECD countries. Yet, the returns are much higher for developing countries, suggesting that the aggregate effect of social capital is systematically related with the level of development. Second, 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 be due to 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 show our empirical results of the augmented augmented-Solow model. First, we present our main results with the new social capital variables. Second, we consider the relationship between our estimates and those from the existing studies on the role of social capital in economic growth. We then perform a robustness check of our empirical results. In the final section, we will touch upon the direction of the future research.

2 The Augmented Augmented-Solow Model

2.1 Derivation of the Level Equation

We extend MRW 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, $A(t)$.[3] We assume the following constant-returns-to-scale Cobb-Douglas production function with the share parameters for physical, human, and social capitals, represented by α, β, and γ, respectively:

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

where we impose the assumptions that $\alpha, \beta, \gamma \in [0, 1)$ and $\alpha + \beta + \gamma \in [0, 1)$. Following MRW, we postulate that the law of motion for each capital is a common across the country, with the depreciation rate for the *i-th* capital being δ_i. The rate of the labor augmenting technological progress is denoted by g, with the initial technology level, $A(0)$, which follows an internationally common distribution. The population growth rate is n and the time-invariant country-specific saving rates for each type of capital are represented by $s_i, i = k, h, s$. Define efficiency labor unit values as $\tilde{y} = Y/AL$ and $\tilde{k}_i = K_i/AL$.

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

Then, under this environment, we can derive Solow's basic equation in efficiency labor unit:

$$\dot{\tilde{k}}_i = s_i \tilde{y} - (n + g + \delta_i)\tilde{k}_i, \tag{2}$$

where $i = k, h, s$. In the steady state, $\dot{\tilde{k}}_i = 0$; thus, it is straightforward to show that steady state per efficient labor income becomes

$$\tilde{y}^* = \left(\left(\frac{s_k}{n + g + \delta_k} \right)^{\alpha} \left(\frac{s_h}{n + g + \delta_h} \right)^{\beta} \left(\frac{s_s}{n + g + \delta_s} \right)^{\gamma} \right)^{\frac{1}{1-\alpha-\beta-\gamma}}. \tag{3}$$

Suppose that the depreciation rate is the same for all the types of capital, $\forall\ i\ \delta_i = \delta$, and that $\ln A(t) = \ln A(0) + gt$ with $\ln A(0) = a + \varepsilon$, where $\varepsilon \sim N(0, \sigma_\varepsilon^2)$. Then, the log per capita income can be represented by the following equation:

$$\begin{aligned} \ln \left(\frac{Y(t)}{L(t)} \right)^* &= a + gt + \frac{\alpha}{1-\alpha-\beta-\gamma} \ln(s_k) + \frac{\beta}{1-\alpha-\beta-\gamma} \ln(s_h) \\ &\quad + \frac{\gamma}{1-\alpha-\beta-\gamma} \ln(s_s) - \frac{\alpha+\beta+\gamma}{1-\alpha-\beta-\gamma} \ln(n + g + \delta) + \varepsilon. \end{aligned} \tag{4}$$

This equation is a straightforward extension of MRW's level regression equation. This equation implies that if each country is in the steady state in year t, then the log per capita income can be expressed as a log linear function of the saving rates for the three types of capital inputs, population growth rate plus $g + \delta$,[4] and a constant term, $a + gt$, as well as a random error term ε. Following MRW, we estimate the level equation (4) in the following two ways. First, we estimate the unrestricted model by regressing log per capita income on the three saving rates and other variables on the right-hand side. Second, we estimate the following *restricted* model with parameter restrictions on α, β, and γ:

$$\begin{aligned} \ln \left(\frac{Y(t)}{L(t)} \right)^* &= a + gt + \frac{\alpha}{1-\alpha-\beta-\gamma} [\ln(s_k) - \ln(n + g + \delta)] + \frac{\beta}{1-\alpha-\beta-\gamma} [\ln(s_h) - \ln(n + g + \delta)] \\ &\quad + \frac{\gamma}{1-\alpha-\beta-\gamma} [\ln(s_s) - \ln(n + g + \delta)] + \varepsilon. \end{aligned} \tag{5}$$

Then, we employed the delta method to estimate the factor share parameters and their standard errors.

2.2 Derivation of the Conditional Convergence Equation

Following MRW, we can also derive a growth equation on the transition path toward the steady state:

$$\ln \tilde{y}(t) - \ln \tilde{y}(0) = \theta[\ln \tilde{y}^* - \ln \tilde{y}(0)], \tag{6}$$

[4] We follow MRW and assume that $n + \delta = 0.05$

where $\theta \equiv 1 - e^{-(n+g+\delta)(1-\alpha-\beta-\gamma)t}$.[5] By substituting for $\tilde{y}^*$ by (3) and using the condition $y = \tilde{y}A$, we obtain the following convergence equation for the augmented augmented-Solow model:

$$\begin{aligned} \ln \frac{y(t)}{y(0)} &= a\theta + gt + \theta \frac{\alpha}{1-\alpha-\beta-\gamma} \ln(s_k) + \theta \frac{\beta}{1-\alpha-\beta-\gamma} \ln(s_h) \\ &+ \theta \frac{\gamma}{1-\alpha-\beta-\gamma} \ln(s_s) - \theta \frac{\alpha+\beta+\gamma}{1-\alpha-\beta-\gamma} \ln(n+g+\delta) - \theta \ln y(0) + \theta\varepsilon. \end{aligned} \quad (7)$$

The equation implies that under all the maintained assumptions, per capita income growth is explained by the determinants of the steady state income as well as the initial income level. In equation (7), λ is the parameter representing the speed of convergence. By using equation (4) or (7), we can explicitly estimate the factor share of the three capital stocks.

3 Data

In order to construct the data set *exclduing* social capital, we followed the data compilation procedure of MRW and Bernanke and Gürkaynak (2002) whereby the MRW model is re-estimated by using updated data until the year 1995. We employed the data set of Mankiw et al. (1992) that is available in Greory Mankiw's web page[6] and that of Bernanke and Gürkaynak (2002) that is available in Ben Bernanke's web page[7] and further extended the data set up to the year 2000 by using the Penn World Tables (PWT) Mark 6.1. The other data sets that we employed include: World Development Indicators (WDI)[World Bank (2003)], World Population Prospects [United Nations Population Division (2005)]. The data appendix explains the details of the data sources and provides a description of the variables employed in this paper.[8]

3.1 Indicators of social capital

In this subsection, we explain our strategy to construct proxy variables for social capital. Durlauf and Fafchamps (2004) provides a comprehensive survey on an empirical strategy to quantify social capital, both in the micro and macro contexts. In particular, we require data on the *saving rate* of social capital accumulation in our augmented MRW model. However, the concept of social capital remains elusive; moreover, nearly all existing studies do not distinguish social capital stock from social capital investments. MRW argues that, in general, when we estimate a variant of the augmented Solow model, a primary question is whether the available data on capital correspond more closely to the stock level

[5]The procedure to derive equation (6) is available from the corresponding author upon request.
[6]http://post.economics.harvard.edu/faculty/mankiw/data/contr1.pdf
[7]http://www.princeton.edu/ bernanke/bernankegurkaynak.zip
[8]The data set employed in this paper, which includes social capital, is available at CIRJE, Faculty of Economics, University of Tokyo (http://www.e.u-tokyo.ac.jp/cirje/research/dp/2006/list.htm).

of capital or to its saving rate. Since the theory requires the employment of the latter, we carefully elaborate a proxy variable for the saving rate of social capital.[9]

In the literature, there are two widely used macro variables of social capital. The first variable is called "*Trust*" and was complied by Knack and Keefer (1997) based on data from the World Values Surveys [World Values Study Group (1999); Inglehart, Ronald, et al. (2003); European Values Study Group and World Values Survey Association (2005)]. This variable is constructed from the survey result of the question, "generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?" *Trust* is the percentage of respondents in each nation replying "most people can be trusted" after deleting the "don't know" response [Knack and Keefer (1997)]. The question is intended to assess the current situation with respect to *Trust* and therefore, this variable appears to capture the *stock* of social capital.

The other variable is the social development indicator, *SOCDEV*, employed by Temple and Johnson (1998). This variable is a famous index of socioeconomic development and was originally constructed by Adelman and Morris (1967). The Adelman-Morris index is constructed by applying factor analysis to 41 social, political, and economic indicators for 74 developing countries for the period 1957–62. While the index is a complicated composite of various observables, Temple and Johnson (1998) concluded that the variable *COMMS* is a good proxy for the strength of civic communities as reflected in trust and membership. As one of the five most important indicators of the *SOCDEV* variable, *COMMS* is composed of a weighted average of the number of radios per head and the rate of newspaper circulation [Temple and Johnson (1998)]. In the *COMMS* variable, since a radios is a durable good, the number of radios is supposed to be a stock variable. On the other hand, newspaper circulation is a flow variable. This variable captures people's saving and investments in shared knowledge—an important aspect of social capital, as pointed out by Ostrom (2000). Hence, it will not be unreasonable to adopt this variable as a proxy of the saving rate of social capital. Accordingly, we adopt the *NEWS* variable, which is defined as the number of daily newspapers circulated per 1,000 people, as a proxy variable for the saving rate of social capital. The data is extracted from WDI of the World Bank [World Bank (2003)].

Other important investments in shared knowledge as social capital should be in the form of exchanging letters. Therefore, we will also consider the *POSTAL* variable that is defined as the average number of letter-post items posted per inhabitant, divided by 1000. The data is taken from Universal Postal

[9] For example, in the case of physical capital, the stock of the capital is measured by capital stock in national accounts. The flow of physical capital is capital formation and the saving rate is captured by, for example, the net national saving rate. In the case of human capital, the Barro-Lee index of the average schooling level of the working age population is used widely in growth regression and is regarded as a stock measure of human capital (Barro and Lee (2000)). The flow of human capital is rarely considered, whereas MRW quantified the saving rate of human capital in terms of the percentage of the working age population in secondary school, i.e., Secondary enrollment ratio $\times$ (Population aged 15–19 / Population aged 15–64).

Union (2005).

Another justification for the use of the *NEWS* and *POSTAL* variables comes from data availability. These two variables are easily available for a larger set of countries and for a longer time period than the *Trust* and *SOCDEV* variables. As Zak and Knack (2001) pointed out, the result of Knack and Keefer (1997) may suffer from a sample selection bias because the data of Knack and Keefer (1997) comes mainly from OECD countries. However, we may effectively mitigate this problem by using the *NEWS* and *POSTAL* variables that are widely available in the cross-section of countries.

4 Estimation Results

This section presents the empirical results and is composed of six subsections. First, we represent the MRW replication results with updated data. Second, we present our main result of the estimation of the augmented augmented-Solow model. Third, we compare our estimation and the existing reduced-form estimations. Fourth, we estimate the depreciation rate of social capital and thereby test a hypothesis of the full depreciation. Fifth, we re-estimate the model using the instrumental variable method in order to determine and mitigate possible endogeneity problems. Finally, a set of robustness analyses will be conducted.

4.1 The MRW Specifications for 1960–1985

First, we replicate the MRW model by using the original PWT 4.0 data, the PTW 6.0 data used by Bernanke and Gürkaynak (2002), and new data based on PTW 6.1 for the period from 1960 to 1985. Thus, we check the properties and comparability of the new data set. Tables 1 and 2 show the results for the level and growth regressions, respectively, both of which are based on the original MRW specification. The estimation results of the new data have several notable features. First, the model restriction is rejected for the level regression with the full sample, which is similar to the results obtained by Bernanke and Gürkaynak (2002). In the same specification, the capital share is smaller while the human capital share is the larger than that in the results of MRW and Bernanke and Gürkaynak (2002). Second, with regard to the growth regression with the full sample, while the model restriction cannot be rejected, the share parameters have the same property as the level regression.

4.2 The Augmented Augmented-Solow model

We now turn to updated data set that spans over 1960–2000. Columns 1 through 6 in Table 3 show the revised version of MRW and Bernanke and Gürkaynak (2002). These results are similar to the results obtained by MRW and Bernanke and Gürkaynak (2002). First, while the fit of the model is favorable for the Non-Oil and the Intermediate samples, the OECD sample contains a significant part that remains unexplained. Second, the original Solow specification yields an implausibly large value of α. On the other hand, for human capital, H, the estimated α and β are approximately 0.25 and 0.3, respectively. Third, the p-values of the model restriction are small, as pointed out by Bernanke and Gürkaynak (2002), thus rejecting the model restrictions.

In Table 3, columns 10–12 show our main results of the level equation (4) of the augmented augmented-Solow model with the *NEWS* variable as an additional independent variable. The model fit improves uniformly. According to the results with the full sample, the adjusted R^2 improved to 0.81 from 0.78 in the augmented Solow model of MRW. The p-values for the model restrictions are still small, but for the sample of intermediate countries, the restriction cannot be rejected.

More importantly, the estimated output elasticity with respect to social capital, γ, is 0.10 and is statistically significant. This result indicates that social capital affects economic growth positively and significantly, although the magnitude is smaller than that of the effect of physical and human capital. The estimated share parameters α and β with the full sample are 0.19 and 0.23, respectively, which are smaller than the estimated parameters based on the augmented Solow model. However, it is not easy to derive a plausible value for each share parameter *a priori*. The conventional value of physical capital share is approximately 0.33, but it is usually calculated under the assumption of a standard production function including neither human nor social capital. MRW found that the share parameter associated with human capital is within the range of 0.23 and 0.33.[10] Further, it is difficult to derive a plausible range for the share of social capital because social capital does not necessarily create positive effects on economic growth; as Olson (1982) pointed out, social capital can generate individually remunerative but socially unproductive effects through the formations of trade unions, political parties, and lobbyist groups.[11] Social capital may simply facilitate collusive behavior among group members [Fafchamps and Minten (2002)]. Moreover, the gains made by those with social capital lead to losses for those without, thus creating a fallacy of composition at the aggregate level [Fafchamps (2006)]. Accordingly, it would be reasonable to observe that the share of social capital is not large.

The final three columns of Table 4 summarize the estimation results of growth equation (7) of the augmented augmented-Solow model with the *NEWS* variable. First, the model fit improves uniformly again if we compare the results with the augmented Solow model of MRW. With regard to the estimated share parameters, α is approximately 0.33 and β falls into the range of 0.14 and 0.23. The γ parameter

[10] If we follow the logic of MRW, in our augmented augmented-Solow model, the shares of physical and human capital would also be lower than those estimated by MRW.

[11] Moreover, while the production of social capital may require tangible inputs such as physical capital and labor, there will be no real compensations for social capital *per se*.

is around 0.07–0.09 and is marginally significant. The rate of convergence, λ, is comparable to the rate obtained by the augmented Solow model of MRW. Finally, the model restrictions cannot be rejected in all specifications, supporting the validity of the augmented augmented-Solow model.

Tables 5 and 6 show the estimation results of the level and growth equations, respectively, of the augmented augmented-Solow model by using the *POSTAL* variable as a variable for the social capital saving rate. The qualitative results are surprisingly similar to those obtained using the *NEWS* variable. In the case of the full and intermediate income countries, the estimated γ falls into the range between 0.09 and 0.11 and there is a gain in terms of the model fit from using the augmented augmented-Solow model.

The overall estimation results of the augmented augmented-Solow model suggest that the inclusion of social capital as an additional production input generates improvements in the fit of the Solow model. Moreover, the extended model appears to generate reasonable estimates because the implied values of structural parameters fall into the plausible range of 0.07–0.11.

4.3 The Reduced-form Growth Regression Model vs. the Augmented Augmented-Solow Model

In this subsection, we will explicitly compare the reduced-form growth regression approach by Knack and Keefer (1997) and Temple and Johnson (1998) with our augmented augmented-Solow model. While Knack and Keefer (1997) and Temple and Johnson (1998) took a standard approach in incorporating social capital into the Barro regression as one of the independent variables, this approach cannot allow us to make inferences on the relative contribution of social capital. Moreover, as is evident from equations (4) and (7), it is difficult to justify the use of the stock value of, instead of the saving rate of social capital. However, one way to justify the use of the stock variable is to suppose that the level of social capital is constant over time. This implies that the saving rate of social capital always corresponds with the depreciation rate of social capital, i.e., a product of the exogenously given depreciation rate and the level of social capital stock. However, such a situation is not always warranted. Moreover, this assumption will undermine the entire logic of social capital *accumulation*.

Nevertheless, it may still be meaningful to consider the possible linkages between the reduced-form approach with a social capital stock variable and our augmented augmented-Solow model. We will argue that there are at least two ways to justify the inclusion of the stock of social capital rather than the saving rate of social capital in equations (4) and (7).[12] First, we can work on a specification with the steady state condition. Second, we can assume the full depreciation of social capital.

[12] In other words, Knack and Keefer (1997) and Temple and Johnson (1998) are regarded as special cases of the augmented augmented-Solow model.

First, in the steady state, we can rewrite the level regression equation (3) in order to replace the saving rate of social capital with its stock variable. Since $\dot{\tilde{k}}_s = 0$ in the steady state, from Solow's basic equation (2) for social capital, we have $s_s = (n + g + \delta_s)\tilde{k}_s/\tilde{y}$. By combining this with equation (3), we obtain another representation of the level regression equation:[13]

$$\begin{aligned}\ln\left(\frac{Y(t)}{L(t)}\right)^* &= \frac{1-\alpha-\beta-\gamma}{1-\alpha-\beta}(a+gt) + \frac{\alpha}{1-\alpha-\beta}\ln s_k + \frac{\beta}{1-\alpha-\beta}\ln s_h \\ &- \frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) + \frac{\gamma}{1-\alpha-\beta}\ln k_s^* + \frac{1-\alpha-\beta-\gamma}{1-\alpha-\beta}\varepsilon.\end{aligned} \quad (8)$$

The corresponding growth equation is written as

$$\begin{aligned}\ln\frac{y(t)}{y(0)} &= \theta\frac{1-\alpha-\beta-\gamma}{1-\alpha-\beta}a + gt + \theta\frac{\alpha}{1-\alpha-\beta}\ln(s_k) + \theta\frac{\beta}{1-\alpha-\beta}\ln(s_h) + \theta\frac{\gamma}{1-\alpha-\beta}\ln k_s^* \\ &-\theta\frac{\alpha+\beta}{1-\alpha-\beta}\ln(n+g+\delta) - \theta\ln y(0) + \theta\frac{1-\alpha-\beta-\gamma}{1-\alpha-\beta}\varepsilon.\end{aligned} \quad (9)$$

The above equation (9) justifies the inclusion of the stock of social capital as an independent variable, suggesting the validity of Knack and Keefer (1997) and Zak and Knack (2001). Since we should employ the *steady state level* of social capital stock (k_s), we extract the *Trust* variable at the latest possible period and add it as an additional independent variable in the level and growth regression equations. First, three columns of Table 7 show the estimation results of the growth equation (9) by including the latest *Trust* variable as an independent variable.[14] The implied level of the elasticity γ with the non-oil countries sample is 0.04, which is implausibly small. Moreover, this parameter is statistically insignificant. However, this result may suffer from an endogeneity bias, and thus, it would be more plausible to employ social capital data for the earliest period possible. This is replicated in the following second case.

The second way to justify the use of social capital stock in the regression equation is to assume the full depreciation of social capital, i.e., $\delta_s = 1$. Under the assumption of the full depreciation of social capital, we can show that the growth regression model becomes one, with the initial social capital on the right-hand side; this is identical to that shown in Knack and Keefer (1997) and Temple and Johnson (1998). Note that the assumption that $\delta_s = 1$ implies that $s_s Y(t) = K_s(t)\ \forall t$. Hence, it is straightforward to show that $s_s = (1 + n + g)k_s(t)/y(t)\ \forall t$. Combining this expression with the growth

[13] This type of equation is derived by MRW in their equation (12) for the case of human capital. It is also straightforward to derive a corresponding growth equation [Islam (1995), equation (18)]

[14] On the other hand, the *SOCDEV* variable is available only for the period around 1960.

equation (7) under the assumption of $\delta_k = \delta_h = \delta$ but $\delta_s = 1$, we obtain

$$\ln\frac{y(t)}{y(0)} = a\theta + gt + \theta\frac{\alpha}{1-\alpha-\beta-\gamma}\ln(s_k) + \theta\frac{\beta}{1-\alpha-\beta-\gamma}\ln(s_h) + \theta\frac{\gamma}{1-\alpha-\beta-\gamma}\ln k_s(0)$$
$$-\theta\frac{\alpha+\beta}{1-\alpha-\beta-\gamma}\ln(n+g+\delta) - \theta\Big(\frac{1-\alpha-\beta}{1-\alpha-\beta-\gamma}\Big)\ln y(0) + \theta\varepsilon. \quad (10)$$

In this case, the equation includes the *initial* value of the stock of social capital. The resulting regression equation (10) is almost identical to the equations employed by Knack and Keefer (1997) and Temple and Johnson (1998). One would argue that the full depreciation assumption is critical for linking a standard reduced-form growth model to the augmented augmented-Solow model. Apart from the issue of assuming that $\delta_s = 1$, which will be investigated later, we estimated the regression equation (10) by using the initial level of the social capital variables adopted by Knack and Keefer (1997) and Temple and Johnson (1998), i.e., *Trust* and *SOCDEV*, respectively.

Table 7 shows the estimation results with the full sample including the initial level of social capital[15]. With the entire non-oil countries sample, the initial *Trust* variable yields the implied level of the elasticity γ being 0.10, which is consistent with the previous estimates. On the other hand, the results with including the *SOCDEV* variable yield the estimated elasticity to be approximately 0.2, which may necessitate further investigations.

In sum, we may say that, in general, we obtain supporting estimates of the structural parameters consistent with the specification of Knack and Keefer (1997). Yet, the results with the specification of Temple and Johnson (1998) are not necessarily comparable to the previous structural parameters.[16]

4.4 A Test of Full Depreciation

In the last subsection, we showed that by imposing an assumption of the full depreciation of social capital, we obtain an almost identical estimation model to the models postulated by Knack and Keefer (1997) and Temple and Johnson (1998). In order to verify the validity of the full depreciation assumption, in this subsection, we will show the procedure and results to estimate the depreciation rate for social capital.

Suppose that $\delta_k = \delta_h = \delta$ and $\delta_s \neq \delta$. Then, the growth regression equation (7) can be rewritten as

[15] Since *SOCDEV* takes negative values in some countries, we treat *SOCDEV* as the log of the stock of social capital. One of the regression equations run by Temple and Johnson (1998) has exactly the same form as this growth regression, although they regard *SOCDEV* as a Total Factor Productivity (TFP) shifter.

[16] A possible reason for the similarities of the results for the stock variable, *Trust*, and the saving rate variable is a high correlation among these variables. The correlation coefficient of the saving rate variable, *NEWS*, with the stock variables, *Trust*, is 0.624. Accordingly, it is not surprising to obtain reasonable estimates even when we utilize social capital *stock* variables.

follows:

$$\ln \frac{y(t)}{y(0)} = \theta \frac{\alpha}{1-\alpha-\beta-\gamma} \ln(s_k) + \theta \frac{\beta}{1-\alpha-\beta-\gamma} \ln(s_h) - \theta \frac{\alpha+\beta}{1-\alpha-\beta-\gamma} \ln(n+g+\delta) - \theta \ln y(0)$$
$$+\theta \frac{\gamma}{1-\alpha-\beta-\gamma} \ln\left(\frac{s_s}{n+g+\delta_s}\right) + [gt + \theta \ln A(0)]. \quad (11)$$

We then postulate the estimation equation for equation (11):

$$\ln \frac{y(t)}{y(0)} = \phi_0 + \phi_1 \ln(s_k) + \phi_2 \ln(s_h) + \phi_3 \ln(n+g+\delta) + \phi_4 \ln y(0)$$
$$+\phi_5 \ln\left(\frac{s_s}{n+\phi_6}\right) + u, \quad (12)$$

where ϕ_i are the coefficients to be estimated. The important coefficient of our interest is ϕ_6 because the model implies $\phi_6 = g + \delta_s$, including the depreciation rate for social capital. Yet, this parameter also involves the technological growth rate, g, due to which we cannot directly estimate the exact value of δ_s. Fortunately, g is considered to be small. According to the reliable estimates of Young (1995) and Hsieh (2002) for the high-performing East Asian countries as well as developed countries, g should be less than 2%. Hence, we can still obtain the lower bound of the depreciation rate.

The estimation results of equation (12) that are obtained by using nonlinear least squares are presented in Table 8. The estimated results of the basic parameters are similar to those under the simplified estimation of equation (7), comparing the results reported in Table 8 with the results in columns 13–15 of Table 4. The estimated value of $\delta_s + g$ is approximately 12%, and the coefficient is statistically significant. Accordingly, it would be reasonable to consider that the lower-bound estimate of the depreciation rate of social capital is approximately 10% per annum.

By testing the null hypothesis that $\hat{\phi}_6$=1, we completely reject the hypothesis that $\delta_s + g = 1$. Hence, the model of the full depreciation of social capital is rejected by the data set.[17] It is also true that the estimated depreciation rate of social capital, i.e., 10%, is much higher than that of physical capital, which is supposed to be approximately 3–5% [Romer (1989) and Nadiri and Prucha (1996)].

The result may suggest that unlike physical capital, continuous investments will be necessary in order to maintain a certain level of social capital for a long period. This may be due to the fact that social capital is intangible and is thus easily eroded by nature unless continuous investment efforts are made.

[17] However, it also rejects the assumption of MRW, i.e., $\delta_i + g = 0.05$, which has also been employed in our previous estimates. Hence, the common depreciation assumption of MRW may generate biased results despite its greater tractability.

4.5 Aggregate Returns to Social Capital

As shown in equation (8) of Nonneman and Vanhoudt (1996), we can compute the steady state social rate of return using the estimated output elasticities and other observable data. The social returns to or the marginal productivity of social capital, the net depreciation of capital, can be expressed as

$$\frac{\partial Y}{\partial K_i} - \delta_i = \sigma_i * \frac{n + g + \delta_i}{s_i} - \delta_i, \qquad (13)$$

where $\sigma_i = \alpha, \beta$, and γ. Based on the estimation in the previous subsection, the depreciation rate of social capital is approximately 10% per annum. We follow Nonneman and Vanhoudt (1996) and assume that the depreciation rates for physical and human capital are both 3%.

It is now straightforward to calculate the social return to capital by using the elasticity estimated by (13). Table 9 presents the calculated social return to capital for Non-Oil, Intermediate, and OECD countries. We report the median values across countries in order to remove the effects of outliers. The first row represents the aggregate returns to social capital based on the *NEWS* variable. They indicate that the social rates of return are 9.77%, 2.03%, and −7.60% for Non-Oil, Intermediate, and OECD countries, respectively, which are smaller than those to physical and human capital. Moreover, the values for OECD countries is negative, suggesting the seriousness of the fallacy of composition hypothesized by Durlauf and Fafchamps (2004) and Fafchamps (2006) in the case of developed countries.[18]

4.6 Endogeneity Bias

A common serious concern with regard to the cross-country growth regressions is the possibility of an endogeneity bias. When we take the Solow model as it is, all the independent variables are treated as exogenous variables by construction. However, in terms of econometric modeling, it is difficult to justify that all variables are exogenously determined. For example, social capital is more likely to be created when income is higher, suggesting a reversed causality [Fafchamps (2006)]. In order to avoid the endogeneity problem, it is desirable to treat at least the saving rate of social capital as an endogenous variable. However, the difficulties in identifying social capital effects from aggregate data are possibly greater than from individual-level data [Durlauf (2002)]. In specific terms, in the aggregate data, one no longer has access to instrumental variables based on the averaging of individual-level variables [Durlauf and Fafchamps (2004)]. Determining a set of appropriate instrumental variables that affect social capital but do not affect the aggregate output is a challenge. First, all values in 1960 are used as instruments since they are predetermined in the regression during 1960–2000. Second, we add the area of each

[18] The results based on the *POSTAL* variable reveal considerably higher returns in developing countries. One possible reason for this is that saving rates based on *POSTAL* are unreasonably low in low-income countries.

country (in log form) as an additional instrumental variable; as compared with a large-area country, people living in a small country may find it easier to communicate among themselves without relying on postal services and mass media. Third, we follow an approach elaborated by Cook (2002) who proposes to use the damages of capital stock caused by World War II as instruments because such damages can be regarded as predetermined exogenous variables. Yet, the instruments employed by Cook (2002) are not available for most of the Asian and African countries. Hence, a cost of using the third approach is the reduction of the sample size that may possibly induce a sample selection bias.

Our estimation method is the efficient two-step generalized method of moments (GMM) estimation, which provides heteroskedasticity consistent estimators. The result is shown in Tables 10 and 11. Since the OECD sample size individually is limited, the tables contain results with the entire sample only. We show the restricted models in order to save space. As regards the level regression, the estimated social capital elasticities, γ, falls in the ranges of 0.11–0.21 and 0.01–0.18 with the *NEWS* and *POSTAL* variables, respectively. With regard to the growth regressions, the estimated parameter falls in the ranges of 0.05–0.12 and 0.05–0.18 with the *NEWS* and *POSTAL* variables, respectively. These estimation results suggest the possibility of endogeneity bias. In fact, we cannot reject all the overidentification tests, thus supporting the validity of our instruments. However, if we include $n + g + \delta$, s_k, as well as s_h or s_s for our instruments, the estimated γ is close to that of the OLS estimates (the last three columns of Tables 10 and 11.[19] Accordingly, the test results may, after all, also justify the reliability of the results based on OLS.

4.7 Robustness

In this section, we will further examine the robustness of our estimation results of the augmented augmented-Solow model. While there is no one-fit-all procedure of the robustness analysis, we conduct four analyses to check the robustness. First, we employ an alternative set of variables for social capital. Second, we follow the argument of Islam (1995) and utilize a panel estimation method in order to control for a possible omitted variable bias as well as endogeneity bias. Thirdly, we employ the test procedure of Temple (1998) to check the robustness by carefully eliminating outliers. Finally, following Hoeffler (2002), the dependent variable of the growth rate of GDP *per worker* is replaced by that of GDP *per capita*.

First, we simultaneously employ the *NEWS* and *POSTAL* variables because these variables do not necessarily capture the same dimension of social capital. While the former is likely to track the degree of impersonal public information sharing, the latter captures private knowledge sharing. The estimation results reported in Table 12 suggest that peer-to-peer information sharing appears to be more important

[19]Note that in these cases, the estimated value of γ falls in the range of 0.04–0.11.

to facilitate aggregate production than public knowledge sharing, which may be sufficiently achived in advance, particularly in developed countries.

Following Knack and Keefer (1997), we utilize the *GROUPS* variable as a proxy for the saving rate of social capital that is defined as the average number of groups cited per respondent in each country. The groups include: a) social welfare services for elderly, handicapped, or deprived people; b) religious or church organizations; c) education, arts, music, or cultural activities; d) trade unions; e) political parties or groups; f) local community action on issues like poverty, employment, housing, racial equality; g) third world development or human rights; h) conservation, the environment, ecology; i) professional associations; j) youth work, e.g., scouts, guides, youth clubs, etc. Closely following Knack and Keefer (1997), we further divide the group variable into two main group variables, i.e., "*Putnam-esque*" and "*Olsonian*" groups [Putnam et al. (1993); Olson (1982)]. Groups b, c, and j from the above list were identified as the "*Putnam-esque*" group, while groups d, e, and i were groups with redistributive goals and were called the "*Olsonian*" group. Hereafter, we refer to the former and latter groups as *P-GROUPS* and *O-GROUPS*, respectively.

Basically, the notion of *GROUP* captures how often people spend time on non-working activities and participate in group activities. Through such activities, people are expected to build intangible trust, kinship, and/or norms. However, participation in groups will involve opportunity costs to the people. Considering these costs as people's investments in social capital formation, we can regard the *GROUP* variables as the measure of the saving rates of social capital.

In Tables 13 and 14, we show the estimation result by using the *GROUP* variables. With the *P-GROUPS* and *O-GROUPS* variables, the estimated level of γ is much smaller than the results by using *NEWS* or *POSTAL* and are statistically insignificant in general. These weak results are consistent with Knack and Keefer (1997) who attended to distinguish the two types of groups and obtained statistically elusive results. We may attribute these results to an attenuation bias due to measurement errors. *GROUP* variables are based only on *whether* or not a respondent belongs a group, and they completely disregard the intensity of participation. Further, the results may be plagued by a small sample bias because the *GROUP* variable is available mainly for *OECD* only. As is widely recognized, MRW's augmented Solow model for OECD countries generates unreasonable results [Nonneman and Vanhoudt (1996)].

Second, the assumption of an internationally common initial productivity level may be too restrictive. Rather, saving and fertility behavior should be affected by productivity level or *vice versa*. In other words, MRW tests the joint hypothesis of the validity of the Solow model and the assumption of a well-behaved error term [Islam (1995)]. As Islam (1995) clearly explains, a panel data framework provides a better and more natural setting to control for the endogeneity bias arising from the correlation between the error term and the explanatory variables. Moreover, the panel approach will mitigate a potential omitted variable bias. In our estimations, we work with the first difference method by dividing the whole period into a first and second period, i.e., 1960–80 and 1980–2000. Since the *POSTAL* variable is not available as a panel data, we only employed the *NEWS* variable for the saving rate of social capital. Tables 15 and 16 summarize the panel estimation results of the level and growth equations, respectively. The estimated parameter, γ, is much smaller than the estimates by using cross-sectional data in Tables 3 and 4 and is largely statistically insignificant. Moreover, the model restrictions are rejected for the most part, particularly for the level regression. Such rather weak evidence may be a manifestation of the seriousness of the fallacy of composition. Alternatively, it can simply be attributed to the lack of reliable panel data to estimate the augmented augmented-Solow model because data on saving rates for human and social capital are difficult to obtain for *each year* throughout the period.

Third, we examine the robustness by eliminating outliers using a procedure developed by Temple (1998). First, before checking for outliers, we follow Temple (1998) and included regional dummy variables. Thus, we may be able to control for the difference of the initial technology level. Next, in order to identify outliers, we employ the method of *least trimmed squares*, which has been proposed by Rousseeuw (1984) and Rousseeuw and Leroy (1987). Then, after eliminating the identified outliers that are listed in Table 5, we estimate the models using only in-sample observations[20]. This procedure is regarded as a simplified version of the reweighted least squares (RWLS).

The results are reported in Table 17. In order to simplify our presentation, we report the results of only unrestricted regressions while we also show the implied values of structural parameters and p-values for the test of the model restriction. Columns 1–3 and 7–9 show the results with regional dummies whereas columns 4–6 and 10–12 are based on the RWLS procedure. Even after adding regional dummies, we obtain results comparable to the case without the dummy variables, although the contribution of physical capital is reduced significantly. With regard to the RWLS procedure, while the level regression results are comparable as before, the growth regression gives smaller estimates for γ.

Finally, following Hoeffler (2002)'s recommendation, GDP per capita is replaced as a dependent variable. In this paper, we use the level or growth of GDP *per worker* as a dependent variable in order to maintain comparability with MRW. The use of GDP per worker may suffer from an endogenous change in the structure of labor supply [Hoeffler (2002)]. However, as shown in Tables 19 and 20, we find basically the same qualitative results as in the case of our main regressions.

[20]In order to mitigate computational burden, we modified the method slightly. Once outliers are identified, all of them are excluded from the second-stage sample.

5 Concluding remarks

In this paper, we constructed and implemented an empirical model to uncover the aggregate output elasticity of social capital, which characterizes the aggregate returns to social capital, by augmenting the augmented-Solow model of MRW. Considering the recent developments of empirical studies on social capital, we believe that we take one step forward in quantifying the role of social capital in comparison with other production inputs. Our empirical results reveal that while social capital contributes to economic growth significantly, the upper bound of the elasticity of social capital to output is approximately 0.10 and is significantly smaller than that of physical and human capital. This small but significantly positive effect of social capital in economic growth is moderately robust in the choice of the variable for social capital, in choice of the sample, and even after eliminating possible outliers. As a by product, our estimation results show that the depreciation rate of social capital is approximately 10% per annum, which is significantly higher than that of physical capital.

The cross-country medians of the aggregate returns to social capital based on the *NEWS* variable are 9.77%, 2.03%, and –7.60% for Non-Oil, Intermediate, and OECD countries, respectively. These returns are smaller than the returns to physical and human capital. In particular, the value for OECD countries is negative and much smaller if we compare it with the results of micro studies on social capital. Our results support a view that the measurement of social capital involves a serious fallacy of composition—arising from collusive behavior among group members—rather than positive externalities [Durlauf and Fafchamps (2004) and Fafchamps (2006)].

However, the problem may persist in measuring the saving rate of social capital. By nature, quantifying social capital is difficult. Nevertheless, it will be rewarding to look for more appropriate variables and estimate parameters by using them in the future studies. Thus, this paper should be regarded as a starting point of the structural approaches estimating the effect of social capital on economic growth.

Our analysis also highlights the importance of designing an appropriate empirical strategy of growth models. Since researchers and policy makers are usually interested in structural parameters, we superimpose a simple structural model upon data to estimate such parameters. We carefully consider the differences among stock, flow, and exogenous variables as well as saving rate in estimating structural parameters. Undoubtedly, structural approaches have their inherent cost—it is not easy to test the validity of theoretical structure *per se*. In our context, we employed a variant of the Solow model that imposes an important assumption that the saving rates are exogenously given. Moreover, we postulate a constant coefficient linear regression model, assuming a common socio-economic structure across countries. Since a number of studies have found recently evidence of multiple regimes in cross-country data, this assumption may be too restrictive [Durlauf (2002)]. Accordingly, these assumptions should be relaxed in future research.

Finally, besides social capital, which was our focus, other variables can be considered as important production inputs that generate economic growth. Our framework is easily extended to estimate the structural parameters of other variables in the context of growth models. Such extensions may be carefully investigated in future studies.

Data Appendix

Data Sources

Data is taken from 5 cross-country data sets:

- Penn World Table Mark 6.1 (PWT) [Heston et al. (2002)]
- World Development Indicators (WDI) [World Bank (2003)]
- World Population Prospects (WPP) [United Nations Population Division (2005)]
- World Values Survey (WVS) [World Values Study Group (1999), Inglehart, Ronald, et al. (2003) and European Values Study Group and World Values Survey Association (2005)]
- Postal Statistics [Universal Postal Union (2005)]

We also use the data set of Mankiw et al. (1992) that is available in Gregory Mankiw's web page[21] and that of Bernanke and Gürkaynak (2002) that is available in Ben Bernanke's web page[22]. Variables denoted as "Cook's WW II" are taken from Cook (2002).

Variable construction

Each variable is set as follows. Note that except for case of the saving rate of social capital, we basically reproduce the strategy of Mankiw et al. (1992) and/or Bernanke and Gürkaynak (2002).

- y $(= Y/L)$: Constant price GDP per capita times working age population ratio. GDP per capita is taken from PWT, and the working age population rate, from WDI.
- n: Working age population growth rate, calculated from WDI's working age population data.
- $g + \delta$: Set 0.05 following MRW.
- s_k $(= I/Y)$: The average share of real investment (including government investment) in real GDP. This is taken from PWT. s_k in 1960 is used as one of instruments.
- s_h (School): Secondary enrollment ratio $\times$ (Population aged 15–19 / Population aged 15–64). These population rates are taken from WPP. Secondary enrollment ratio is from WDI.
- s_s: The main results use daily newspaper circulation (*NEWS*) from WDI. We take the average of each 5 year from 1975 to 1995 because the data set includes sets of 5 years begining from 1975. For 2000, the collected counries are limited and the growing presence of information technology probably leads to a fall in the importance of newspapers; thus we delete 2000. *POSTAL* is the average number of letter-post items posted per inhabitant, divided by 1000. The data is from Postal Statistics. Since the data accumulates annually after 1980, we take the annual average from 1980 to 2000. *GROUP* and its subcategories are calculated from WVS. The definitions of *GROUP*, *O-GROUP* and *P-GROUP* are those of Knack and Keefer (1997). *GROUP* is divided by 10 and the others, by 3, the total number of the category in each index. Note that the division (by 1000, 10, 3) is perfectly arbitrary because of the log-linear form of the estimation models.
- *Trust* (earliest possible data): *Trust* measure is taken from WVS. If more than two data is available for a country, we choose the measure for the earliest period possible. This is the method followed in Knack and Keefer (1997), Zak and Knack (2001), and Beugelsdijk et al. (2004).
- *Trust* (latest possible data): *Trust* measure is taken from WVS. The only difference is choosing the index from the latest available data.
- *SOCDEV*: This was drawn from Adelman and Morris (1967), p.170. It is exactly the same index used by Temple and Johnson (1998).

[21] http://post.economics.harvard.edu/faculty/mankiw/data/contr1.pdf
[22] http://www.princeton.edu/ bernanke/bernankegurkaynak.zip

- Barro-Lee: Average years of schooling for the working age population corresponding to the years in Barro and Lee (2000).
- Area: The country's area in 1995, taken from WDI.
- Price of consumption (/investment) goods in 1960: This was taken from PWT.
- Cook's WW II: These are indices related to damages on capital stock because of World War II and were constructed in Cook (2002)

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Table 1: Level Regressions for 1960–1985: MRW specification

	PWT 4.0 (by MRW)			PWT 6.0 (by BG)			PWT 6.1		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	98	75	22	90	72	21	99	76	23
constant	6.84	7.79	8.64	6.71	8.38	10.29	6.83	7.81	11.75
	(1.18)	(1.19)	(2.21)	(1.09)	(1.12)	(1.93)	(1.14)	(1.21)	(1.73)
$\ln s_k$	0.70	0.70	0.28	0.42	0.51	-0.01	0.38	0.53	0.56
	(0.13)	(0.15)	(0.39)	(0.10)	(0.11)	(0.30)	(0.10)	(0.12)	(0.25)
$\ln s_h$	0.65	0.73	0.77	0.56	0.71	1.01	0.65	0.72	0.66
	(0.07)	(0.10)	(0.29)	(0.08)	(0.09)	(0.27)	(0.07)	(0.10)	(0.23)
$\ln(n+g+\delta)$	-1.75	-1.50	-1.08	-1.82	-1.42	-0.78	-1.83	-1.64	-0.27
	(0.42)	(0.40)	(0.76)	(0.39)	(0.38)	(0.61)	(0.41)	(0.41)	(0.55)
R^2	0.79	0.78	0.35	0.76	0.78	0.51	0.74	0.75	0.52
$\bar{R}^2$	0.78	0.77	0.24	0.76	0.77	0.42	0.74	0.74	0.44
s.e.e.	0.51	0.45	0.32	0.47	0.43	0.26	0.52	0.48	0.24
Restricted Reg									
constant	7.85	7.97	8.72	8.91	8.89	9.73	8.89	8.82	9.37
	(0.14)	(0.15)	(0.47)	(0.10)	(0.11)	(0.29)	(0.11)	(0.12)	(0.26)
$\ln \frac{s_k}{n+g+\delta}$	0.78	0.71	0.28	0.46	0.53	-0.06	0.43	0.56	0.35
	(0.12)	(0.14)	(0.33)	(0.10)	(0.11)	(0.24)	(0.10)	(0.12)	(0.21)
$\ln \frac{s_h}{n+g+\delta}$	0.66	0.73	0.77	0.58	0.72	1.00	0.67	0.75	0.62
	(0.07)	(0.09)	(0.28)	(0.08)	(0.08)	(0.26)	(0.07)	(0.09)	(0.23)
R^2	0.78	0.78	0.35	0.75	0.78	0.50	0.74	0.74	0.47
$\bar{R}^2$	0.78	0.77	0.24	0.76	0.77	0.42	0.74	0.74	0.44
s.e.e.	0.51	0.45	0.32	0.48	0.43	0.25	0.53	0.48	0.25
F-stat.	0.74	0.02	0.00	4.08	0.21	0.09	3.30	0.71	1.93
p-value	0.39	0.88	0.97	0.05	0.65	0.77	0.07	0.40	0.18
Implied α	0.31	0.29	0.14	0.23	0.24	-0.03	0.20	0.24	0.18
	(0.04)	(0.05)	(0.15)	(0.04)	(0.04)	(0.12)	(0.04)	(0.04)	(0.10)
Implied β	0.27	0.30	0.37	0.28	0.32	0.52	0.32	0.32	0.32
	(0.03)	(0.04)	(0.12)	(0.04)	(0.04)	(0.11)	(0.04)	(0.04)	(0.10)

Standar errors are in parentheses.

Table 2: Growth Regressions for 1960–1985: MRW specification

	PWT 4.0 (by MRW)			PWT 6.0 (by BG)			PWT 6.1		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	98	75	22	90	72	21	99	76	23
constant	3.02	3.71	2.76	3.04	4.04	4.09	3.23	3.52	5.47
	(0.83)	(0.91)	(1.20)	(0.78)	(0.87)	(1.30)	(0.73)	(0.85)	(1.07)
$\ln y60$	-0.29	-0.37	-0.40	-0.29	-0.32	-0.43	-0.26	-0.25	-0.48
	(0.06)	(0.07)	(0.07)	(0.06)	(0.07)	(0.08)	(0.06)	(0.07)	(0.06)
$\ln s_k$	0.52	0.54	0.33	0.35	0.44	0.32	0.35	0.46	0.47
	(0.09)	(0.10)	(0.17)	(0.06)	(0.08)	(0.16)	(0.06)	(0.08)	(0.12)
$\ln s_h$	0.23	0.27	0.23	0.20	0.27	0.22	0.22	0.20	0.23
	(0.06)	(0.08)	(0.15)	(0.06)	(0.07)	(0.18)	(0.05)	(0.08)	(0.12)
$\ln(n+g+\delta)$	-0.51	-0.55	-0.86	-0.44	-0.30	-0.56	-0.31	-0.22	-0.33
	(0.29)	(0.29)	(0.34)	(0.28)	(0.28)	(0.31)	(0.27)	(0.29)	(0.25)
R^2	0.49	0.47	0.72	0.50	0.50	0.77	0.50	0.44	0.83
$\bar{R}^2$	0.46	0.43	0.65	0.48	0.47	0.71	0.49	0.41	0.79
s.e.e.	0.33	0.30	0.15	0.30	0.28	0.13	0.31	0.30	0.11
Implied λ	0.0136	0.0182	0.0203	0.0134	0.0152	0.0222	0.0122	0.0116	0.0260
	(0.0035)	(0.0043)	(0.0047)	(0.0036)	(0.0042)	(0.0056)	(0.0030)	(0.0037)	(0.0046)
Restricted Reg									
constant	2.46	3.09	3.55	2.83	3.19	4.16	2.70	2.61	4.43
	(0.47)	(0.53)	(0.63)	(0.53)	(0.61)	(0.76)	(0.46)	(0.59)	(0.56)
$\ln y60$	-0.30	-0.37	-0.40	-0.29	-0.34	-0.43	-0.28	-0.28	-0.46
	(0.06)	(0.07)	(0.07)	(0.06)	(0.07)	(0.08)	(0.05)	(0.07)	(0.06)
$\ln \frac{s_k}{n+g+\delta}$	0.50	0.51	0.40	0.34	0.41	0.33	0.33	0.43	0.39
	(0.08)	(0.09)	(0.15)	(0.06)	(0.07)	(0.13)	(0.06)	(0.07)	(0.09)
$\ln \frac{s_h}{n+g+\delta}$	0.24	0.27	0.24	0.20	0.26	0.22	0.23	0.19	0.20
	(0.06)	(0.08)	(0.14)	(0.06)	(0.08)	(0.17)	(0.05)	(0.08)	(0.11)
R^2	0.48	0.46	0.71	0.50	0.49	0.77	0.50	0.43	0.81
$\bar{R}^2$	0.46	0.43	0.65	0.48	0.47	0.71	0.48	0.41	0.79
s.e.e.	0.33	0.30	0.15	0.30	0.29	0.13	0.31	0.30	0.11
F-stat.	0.69	0.70	0.62	0.14	1.92	0.00	0.88	2.13	1.29
p-value	0.41	0.40	0.44	0.71	0.17	0.95	0.35	0.15	0.27
Implied λ	0.0141	0.0186	0.0206	0.0138	0.00165	0.0222	0.0130	0.0130	0.0249
	(0.0034)	(0.0043)	(0.0046)	(0.0035)	(0.0043)	(0.0054)	(0.0029)	(0.0038)	(0.0044)
implied α	0.48	0.44	0.38	0.41	0.41	0.34	0.40	0.48	0.37
	(0.07)	(0.07)	(0.13)	(0.07)	(0.07)	(0.15)	(0.07)	(0.09)	(0.09)
Implied β	0.23	0.23	0.23	0.24	0.26	0.22	0.27	0.21	0.19
	(0.05)	(0.06)	(0.11)	(0.06)	(0.06)	(0.14)	(0.05)	(0.07)	(0.09)

Standar errors are in parentheses.

Table 3: Level Regressions for 1960–2000, Saving Rate of Social Capital: *NEWS*

	$Y = K_k^{\alpha}(AL)^{1-\alpha}$			$Y = K_k^{\alpha}K_h^{\beta}(AL)^{1-\alpha-\beta}$			$Y = K_k^{\alpha}K_s^{\gamma}(AL)^{1-\alpha-\gamma}$			$Y = K_k^{\alpha}K_h^{\beta}K_s^{\gamma}(AL)^{1-\alpha-\beta-\gamma}$		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	98	76	23	98	76	23	98	76	23	98	76	23
constant	3.08	2.97	9.17	4.98	6.04	10.19	5.89	6.30	8.88	5.97	7.28	9.12
	(1.62)	(1.56)	(2.56)	(1.27)	(1.29)	(2.55)	(1.29)	(1.32)	(2.04)	(1.19)	(1.19)	(2.19)
$\ln s_k$	1.11	1.09	0.63	0.48	0.59	0.54	0.49	0.57	0.04	0.34	0.40	0.05
	(0.12)	(0.16)	(0.42)	(0.12)	(0.14)	(0.41)	(0.12)	(0.15)	(0.38)	(0.12)	(0.13)	(0.39)
$\ln s_h$				0.82	0.88	0.57				0.50	0.60	0.12
				(0.10)	(0.13)	(0.37)				(0.11)	(0.13)	(0.35)
$\ln s_s$							0.32	0.33	0.33	0.19	0.22	0.31
							(0.04)	(0.05)	(0.09)	(0.05)	(0.05)	(0.11)
$\ln(n+g+\delta)$	-3.07	-3.14	-0.77	-2.78	-2.53	-0.84	-1.95	-1.87	-0.73	-2.20	-1.89	-0.74
	(0.57)	(0.54)	(0.80)	(0.44)	(0.43)	(0.77)	(0.46)	(0.46)	(0.64)	(0.43)	(0.41)	(0.65)
R^2	0.63	0.60	0.20	0.78	0.79	0.30	0.79	0.79	0.52	0.82	0.84	0.52
$\bar{R}^2$	0.62	0.64	0.12	0.78	0.78	0.18	0.78	0.78	0.44	0.81	0.83	0.41
s.e.e.	0.72	0.68	0.32	0.55	0.50	0.31	0.55	0.51	0.26	0.51	0.45	0.26
Restricted Reg												
constant	8.12	8.13	9.51	8.82	8.76	9.51	8.88	8.81	9.75	9.01	8.99	9.74
	(0.10)	(0.13)	(0.40)	(0.11)	(0.13)	(0.39)	(0.12)	(0.13)	(0.33)	(0.11)	(0.12)	(0.34)
$\ln \frac{s_k}{n+g+\delta}$	1.31	1.41	0.67	0.60	0.70	0.47	0.56	0.66	0.15	0.42	0.46	0.13
	(0.11)	(0.13)	(0.29)	(0.12)	(0.14)	(0.31)	(0.12)	(0.14)	(0.27)	(0.12)	(0.13)	(0.28)
$\ln \frac{s_h}{n+g+\delta}$				0.86	0.96	0.55				0.50	0.63	0.15
				(0.10)	(0.13)	(0.34)				(0.12)	(0.13)	(0.32)
$\ln \frac{s_s}{n+g+\delta}$							0.34	0.35	0.33	0.22	0.23	0.31
							(0.04)	(0.05)	(0.09)	(0.05)	(0.05)	(0.10)
R^2	0.59	0.60	0.20	0.76	0.78	0.29	0.77	0.77	0.51	0.81	0.83	0.52
$\bar{R}^2$	0.62	0.64	0.12	0.78	0.78	0.18	0.78	0.78	0.44	0.81	0.83	0.41
s.e.e.	0.75	0.68	0.31	0.58	0.51	0.30	0.57	0.52	0.25	0.52	0.45	0.26
F-stat.	9.71	11.01	0.02	9.26	4.46	0.07	5.42	3.63	0.19	6.61	2.10	0.08
p-value	0.00	0.00	0.90	0.00	0.04	0.79	0.02	0.06	0.67	0.01	0.15	0.78
implied α	0.57	0.58	0.40	0.24	0.26	0.23	0.30	0.33	0.10	0.19	0.20	0.08
	(0.02)	(0.02)	(0.10)	(0.05)	(0.05)	(0.14)	(0.05)	(0.05)	(0.17)	(0.05)	(0.05)	(0.17)
Implied β				0.35	0.36	0.27				0.23	0.27	0.10
				(0.04)	(0.04)	(0.15)				(0.05)	(0.05)	(0.19)
Implied γ							0.18	0.18	0.22	0.10	0.09	0.19
							(0.03)	(0.03)	(0.08)	(0.03)	(0.03)	(0.07)

Standar errors are in parentheses.

Table 4: Growth Regressions for 1960–2000, Saving Rate of Social Capital: *NEWS*

	Unconditional Convergence			$Y = K_k^\alpha (AL)^{1-\alpha}$			$Y = K_k^\alpha K_h^\beta (AL)^{1-\alpha-\beta}$			$Y = K_k^\alpha K_s^\gamma (AL)^{1-\alpha-\gamma}$			$Y = K_k^\alpha K_h^\beta K_s^\gamma (AL)^{1-\alpha-\beta-\gamma}$		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	98	76	23	98	76	23	98	76	23	98	76	23	98	76	23
constant	-0.63	-0.00	5.06	1.09	1.24	3.39	2.51	3.16	3.98	2.93	3.34	4.34	3.30	4.50	4.56
	(0.60)	(0.69)	(1.13)	(1.06)	(1.09)	(2.06)	(1.02)	(1.18)	(2.27)	(1.07)	(1.18)	(2.30)	(1.03)	(1.21)	(2.43)
$\ln y60$	0.15	0.08	-0.43	-0.19	-0.26	-0.46	-0.38	-0.45	-0.48	-0.38	-0.44	-0.55	-0.45	-0.55	-0.56
	(0.07)	(0.08)	(0.12)	(0.07)	(0.08)	(0.11)	(0.08)	(0.10)	(0.11)	(0.08)	(0.09)	(0.15)	(0.08)	(0.10)	(0.15)
$\ln s_k$				0.69	0.73	0.40	0.47	0.58	0.38	0.49	0.55	0.26	0.40	0.46	0.27
				(0.09)	(0.12)	(0.29)	(0.09)	(0.12)	(0.29)	(0.09)	(0.12)	(0.33)	(0.09)	(0.12)	(0.33)
$\ln s_h$							0.42	0.43	0.18				0.29	0.34	0.11
							(0.09)	(0.13)	(0.27)				(0.10)	(0.13)	(0.29)
$\ln s_s$										0.16	0.17	0.10	0.10	0.14	0.09
										(0.04)	(0.05)	(0.11)	(0.04)	(0.05)	(0.12)
$\ln(n+g+\delta)$				-0.95	-1.16	-0.89	-1.29	-1.36	-0.91	-0.89	-0.99	-0.86	-1.15	-1.18	-0.87
				(0.42)	(0.43)	(0.53)	(0.39)	(0.41)	(0.54)	(0.38)	(0.40)	(0.54)	(0.38)	(0.39)	(0.55)
R^2	0.04	0.02	0.38	0.46	0.43	0.56	0.56	0.51	0.57	0.55	0.52	0.58	0.59	0.56	0.59
$\bar{R}^2$	0.03	0.00	0.35	0.44	0.41	0.49	0.54	0.48	0.48	0.53	0.49	0.49	0.57	0.53	0.46
s.e.e.	0.62	0.57	0.24	0.47	0.44	0.22	0.42	0.42	0.22	0.43	0.41	0.22	0.41	0.39	0.22
Implied λ	-0.0034	-0.0020	0.0140	0.0052	0.0075	0.00153	0.0118	0.0148	0.0165	0.0119	0.0144	0.0202	0.0147	0.0202	0.0203
	(0.0016)	(0.0018)	(0.0052)	(0.0022)	(0.0028)	(0.0049)	(0.0031)	(0.0043)	(0.0055)	(0.0031)	(0.0040)	(0.0084)	(0.0035)	(0.0055)	(0.0086)
Restricted Reg															
constant				1.63	2.08	4.66	3.34	3.88	4.90	3.46	3.90	5.61	4.05	5.01	5.59
				(0.52)	(0.60)	(0.99)	(0.61)	(0.78)	(1.04)	(0.64)	(0.75)	(1.43)	(0.65)	(0.83)	(1.45)
$\ln y60$				-0.18	-0.23	-0.47	-0.35	-0.42	-0.49	-0.36	-0.42	-0.56	-0.42	-0.54	-0.56
				(0.07)	(0.08)	(0.11)	(0.07)	(0.09)	(0.11)	(0.07)	(0.09)	(0.15)	(0.07)	(0.10)	(0.15)
$\ln \frac{s_k}{n+g+\delta}$				0.71	0.77	0.54	0.50	0.61	0.47	0.50	0.58	0.40	0.42	0.48	0.38
				(0.08)	(0.11)	(0.20)	(0.09)	(0.11)	(0.22)	(0.09)	(0.11)	(0.25)	(0.09)	(0.11)	(0.26)
$\ln \frac{s_h}{n+g+\delta}$							0.41	0.43	0.22				0.29	0.34	0.16
							(0.09)	(0.13)	(0.25)				(0.10)	(0.13)	(0.27)
$\ln \frac{s_s}{n+g+\delta}$										0.16	0.17	0.10	0.10	0.14	0.08
										(0.04)	(0.05)	(0.11)	(0.04)	(0.05)	(0.12)
R^2				0.46	0.43	0.55	0.55	0.50	0.57	0.55	0.51	0.57	0.58	0.56	0.59
$\bar{R}^2$				0.44	0.41	0.49	0.54	0.48	0.48	0.53	0.49	0.49	0.57	0.53	0.46
s.e.e.				0.47	0.44	0.21	0.42	0.41	0.21	0.43	0.41	0.21	0.41	0.39	0.22
F-stat.				0.33	0.86	0.49	1.03	0.67	0.21	0.39	0.40	0.50	0.86	0.34	0.29
p-value				0.56	0.36	0.49	0.31	0.42	0.64	0.53	0.53	0.49	0.36	0.56	0.60
Implied λ				0.0048	0.0066	0.0157	0.0108	0.0138	0.0170	0.0113	0.0137	0.0206	0.0138	0.0195	0.0206
				(0.0020)	(0.0024)	(0.0049)	(0.0028)	(0.0040)	(0.0054)	(0.0029)	(0.0038)	(0.0084)	(0.0032)	(0.0052)	(0.0086)
implied α				0.80	0.77	0.54	0.39	0.42	0.40	0.49	0.49	0.38	0.34	0.32	0.32
				(0.05)	(0.05)	(0.10)	(0.07)	(0.08)	(0.17)	(0.07)	(0.07)	(0.20)	(0.06)	(0.07)	(0.18)
Implied β							0.32	0.30	0.18				0.23	0.23	0.14
							(0.06)	(0.07)	(0.19)				(0.07)	(0.07)	(0.22)
Implied γ										0.15	0.14	0.09	0.08	0.09	0.07
										(0.04)	(0.04)	(0.10)	(0.05)	(0.05)	(0.14)

Standar errors are in parentheses.

Table 5: Level Regressions for 1960–2000, Saving Rate of Social Capital: *POSTAL*

	$Y = K^{\alpha}S^{\gamma}(AL)^{1-\alpha-\gamma}$			$Y = K^{\alpha}H^{\beta}S^{\gamma}(AL)^{1-\alpha-\beta-\gamma}$		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	96	74	22	96	74	22
constant	8.11	7.14	10.79	7.82	8.30	10.75
	(1.47)	(1.64)	(1.61)	(1.27)	(1.37)	(1.69)
$\ln s_k$	0.44	0.47	0.23	0.22	0.28	0.23
	(0.12)	(0.19)	(0.27)	(0.12)	(0.16)	(0.28)
$\ln s_h$				0.58	0.74	-0.03
				(0.10)	(0.13)	(0.26)
$\ln s_s$	0.32	0.27	0.33	0.22	0.18	0.33
	(0.04)	(0.06)	(0.06)	(0.04)	(0.05)	(0.06)
$\ln(n+g+\delta)$	-1.21	-1.54	-0.18	-1.61	-1.58	-0.17
	(0.53)	(0.58)	(0.51)	(0.46)	(0.48)	(0.53)
R^2	0.77	0.73	0.73	0.83	0.82	0.73
$\bar{R}^2$	0.76	0.72	0.69	0.82	0.81	0.67
s.e.e.	0.57	0.57	0.20	0.49	0.47	0.20
Restricted Reg						
Constant	9.29	9.27	9.85	9.40	9.33	9.85
	(0.16)	(0.22)	(0.26)	(0.14)	(0.18)	(0.27)
$\ln \frac{s_k}{n+g+\delta}$	0.45	0.50	0.13	0.24	0.29	0.14
	(0.13)	(0.19)	(0.20)	(0.12)	(0.16)	(0.21)
$\ln \frac{s_h}{n+g+\delta}$				0.58	0.75	-0.06
				(0.10)	(0.12)	(0.25)
$\ln \frac{s_s}{n+g+\delta}$	0.34	0.30	0.33	0.23	0.19	0.33
	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)	(0.06)
R^2	0.76	0.72	0.73	0.83	0.82	0.73
$\bar{R}^2$	0.76	0.72	0.69	0.82	0.81	0.67
s.e.e.	0.57	0.57	0.19	0.49	0.47	0.20
F-stat.	0.66	1.71	0.36	1.58	0.58	0.29
p-value	0.42	0.20	0.56	0.21	0.45	0.59
Implied α	0.25	0.28	0.09	0.12	0.13	0.10
	(0.06)	(0.08)	(0.13)	(0.06)	(0.07)	(0.14)
Implied β				0.28	0.34	-0.04
				(0.04)	(0.04)	(0.20)
Implied γ	0.19	0.17	0.22	0.11	0.09	0.24
	(0.03)	(0.04)	(0.05)	(0.03)	(0.03)	(0.04)

Standar errors are in parentheses.

Table 6: Growth Regressions for 1960–2000, Saving Rate of Social Capital: *POSTAL*

	$Y = K^{\alpha}S^{\gamma}(AL)^{1-\alpha-\gamma}$			$Y = K^{\alpha}H^{\beta}S^{\gamma}(AL)^{1-\alpha-\beta-\gamma}$		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	96	74	22	96	74	22
constant	4.01	3.69	9.48	4.58	5.11	9.48
	(1.19)	(1.30)	(3.44)	(1.13)	(1.33)	(3.56)
$\ln Y60$	-0.36	-0.36	-0.90	-0.47	-0.51	-0.90
	(0.07)	(0.08)	(0.23)	(0.08)	(0.09)	(0.24)
$\ln s_k$	0.43	0.45	0.25	0.31	0.36	0.25
	(0.10)	(0.14)	(0.28)	(0.10)	(0.14)	(0.29)
$\ln s_h$				0.33	0.38	-0.01
				(0.09)	(0.13)	(0.28)
$\ln s_s$	0.17	0.14	0.28	0.13	0.13	0.28
	(0.04)	(0.05)	(0.13)	(0.04)	(0.04)	(0.14)
$\ln(n+g+\delta)$	-0.46	-0.58	-0.29	-0.82	-0.83	-0.29
	(0.40)	(0.45)	(0.58)	(0.39)	(0.44)	(0.61)
R^2	0.54	0.49	0.65	0.60	0.56	0.65
$\bar{R}^2$	0.52	0.47	0.57	0.58	0.53	0.55
s.e.e.	0.43	0.42	0.20	0.40	0.40	0.21
Implied λ	0.0112	0.0113	0.0577	0.0161	0.0181	0.0581
	(0.0029)	(0.0033)	(0.0576)	(0.0036)	(0.0049)	(0.0611)
Restricted Reg						
Constant	3.69	3.66	8.57	4.71	5.03	8.61
	(0.65)	(0.73)	(1.92)	(0.67)	(0.84)	(2.05)
$\ln Y60$	-0.36	-0.36	-0.87	-0.47	-0.52	-0.87
	(0.07)	(0.08)	(0.20)	(0.07)	(0.09)	(0.21)
$\ln \frac{s_k}{n+g+\delta}$	0.42	0.45	0.21	0.31	0.36	0.21
	(0.10)	(0.14)	(0.24)	(0.10)	(0.14)	(0.24)
$\ln \frac{s_h}{n+g+\delta}$				0.32	0.38	-0.02
				(0.09)	(0.13)	(0.26)
$\ln \frac{s_s}{n+g+\delta}$	0.16	0.14	0.26	0.13	0.13	0.26
	(0.04)	(0.04)	(0.11)	(0.03)	(0.04)	(0.13)
R^2	0.54	0.50	0.65	0.60	0.56	0.65
$\bar{R}^2$	0.52	0.47	0.57	0.58	0.52	0.55
s.e.e.	0.42	0.42	0.20	0.40	0.40	0.20
F-stat.	0.10	0.00	0.10	0.02	0.01	0.09
p-value	0.76	0.98	0.75	0.89	0.94	0.76
Implied λ	0.0113	0.0113	0.0505	0.0160	0.0181	0.0512
	(0.0028)	(0.0032)	(0.0374)	(0.0035)	(0.0048)	(0.0409)
Implied α	0.45	0.47	0.16	0.25	0.26	0.16
	(0.08)	(0.10)	(0.17)	(0.07)	(0.09)	(0.18)
Implied β				0.26	0.28	-0.01
				(0.06)	(0.07)	(0.22)
Implied γ	0.17	0.15	0.20	0.11	0.09	0.20
	(0.04)	(0.05)	(0.07)	(0.04)	(0.05)	(0.07)

Standar errors are in parentheses.

Table 7: Growth Regressions for 1960–2000, Stock of the Social Capital (k_s): *Trust/SOCDEV*

k_s:	Trust, the latest data			Trust, the earliest data			SOCDEV	
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.
# of obs	51	48	23	51	48	23	56	48
constant	3.18	4.99	3.86	3.69	5.71	4.23	3.90	4.61
	(1.28)	(1.22)	(2.29)	(1.30)	(1.21)	(2.50)	(1.58)	(1.95)
$\ln y60$	-0.53	-0.57	-0.42	-0.53	-0.57	-0.52	-0.63	-0.67
	(0.09)	(0.08)	(0.14)	(0.09)	(0.08)	(0.17)	(0.11)	0.14
$\ln s_k$	0.44	0.72	0.50	0.45	0.74	0.34	0.26	0.33
	(0.12)	(0.13)	(0.33)	(0.11)	(0.13)	(0.33)	(0.10)	(0.14)
$\ln s_h$	0.57	0.65	0.33	0.53	0.62	0.08	0.32	0.40
	(0.14)	(0.13)	(0.33)	(0.14)	(0.13)	(0.46)	(0.13)	(0.15)
$\ln k_s$	0.02	0.06	-0.14	-1.50	-1.18	-0.86	0.26	0.26
	(0.09)	(0.08)	(0.17)	(0.43)	(0.38)	(0.58)	(0.11)	(0.14)
$\ln(n+g+\delta)$	-1.69	-1.41	-0.89	0.11	0.16	0.08	-1.24	-1.24
	(0.43)	(0.38)	(0.55)	(0.10)	(0.08)	(0.28)	(0.51)	(0.57)
R^2	0.58	0.70	0.59	0.59	0.72	0.57	0.61	0.60
$\bar{R}^2$	0.54	0.66	0.47	0.55	0.69	0.45	0.57	0.55
s.e.e.	0.34	0.30	0.22	0.34	0.29	0.22	0.36	0.37
Implied λ	0.0189	0.0210	0.0138					
	(0.0049)	(0.0049)	(0.0059)					
Restricted Reg								
Constant	4.74	5.09	3.99	4.91	5.30	5.03	5.59	5.98
	(0.78)	(0.71)	(1.42)	(0.77)	(0.69)	(1.92)	(0.92)	(1.19)
$\ln y60$	-0.50	-0.57	-0.42	-0.50	-0.57	-0.50	-0.63	-0.68
	(0.09)	(0.08)	(0.13)	(0.09)	(0.08)	(0.17)	(0.11)	(0.14)
$\ln \frac{s_k}{n+g+\delta}$	0.51	0.73	0.51	0.50	0.71	0.47	0.28	0.34
	(0.11)	(0.11)	(0.22)	(0.11)	(0.11)	(0.23)	(0.10)	(0.14)
$\ln \frac{s_h}{n+g+\delta}$	0.58	0.65	0.34	0.53	0.61	0.19	0.34	0.42
	(0.14)	(0.13)	(0.29)	(0.14)	(0.12)	(0.40)	(0.13)	(0.15)
$\ln k_s$	0.06	0.06	-0.14	0.15	0.15	0.02	0.26	0.28
	(0.09)	(0.07)	(0.15)	(0.09)	(0.08)	(0.25)	(0.11)	(0.14)
R^2	0.56	0.70	0.59	0.58	0.72	0.57	0.59	0.59
$\bar{R}^2$	0.54	0.66	0.47	0.55	0.69	0.45	0.57	0.55
s.e.e.	0.34	0.29	0.21	0.34	0.28	0.22	0.36	0.36
F-stat.	2.33	0.01	0.01	1.36	0.17	0.27	1.72	0.78
p-value	0.13	0.92	0.94	0.25	0.68	0.61	0.20	0.38
Implied λ	0.0173	0.0209	0.0138	0.0110	0.0137	0.0164	0.0116	0.0131
	(0.0046)	(0.0047)	(0.0057)	(0.0049)	(0.0046)	(0.0085)	(0.0042)	(0.050)
Implied α	0.32	0.37	0.40	0.33	0.37	0.40	0.22	0.24
	(0.06)	(0.05)	(0.16)	(0.06)	(0.05)	(0.19)	(0.08)	(0.09)
Implied β	0.36	0.33	0.27	0.35	0.32	0.17	0.27	0.29
	(0.06)	(0.05)	(0.18)	(0.06)	(0.05)	(0.30)	(0.08)	(0.08)
implied γ	0.04	0.03	-0.11	0.10	0.08	0.02	0.21	0.19
	(0.06)	(0.04)	(0.11)	(0.06)	(0.04)	(0.22)	(0.11)	(0.10)

Standar errors are in parentheses. SOCDEV does not take log.

To calculate structural parameters, first three columns are imposed model in equation (9). Remaining columns are imposed equation (10).

Table 8: Growth Regressions for 1960–2000, Non-linear Least Squares Estimation

	Non-linear Least Squares		
	Non Oil	Int.	OECD
# of obs.	98	76	23
constant	3.24	4.41	4.50
	(0.99)	(1.22)	(2.19)
ϕ_1	-0.45	-0.55	-0.56
	(0.07)	(0.10)	(0.14)
ϕ_2	0.40	0.46	0.27
	(0.11)	(0.13)	(0.31)
ϕ_3	0.29	0.34	0.11
	(0.10)	(0.17)	(0.48)
ϕ_4	-1.10	-1.11	-0.83
	(0.35)	(0.37)	(0.40)
ϕ_5	0.10	0.14	0.09
	(0.03)	(0.05)	(0.09)
$\phi_6\ (= \delta_s + g)$	0.12	0.12	0.11
	(0.00)	(0.00)	(0.00)
SSR	15.63	10.91	0.84
s.e.e.	0.41	0.40	0.23

Heteroskedasticity robust standard errors are in parenteses.
The model is equation (12).

Table 9: Median of Aggregate Returns to Social, Physical, and Human Capitals (%)

	Sample		
Type of capital	Non-Oil	Int.	OECD
Social (NEWS)	9.77	2.03	-7.60
Physical	9.15	9.22	9.41
Human	24.60	26.93	15.06

Calculation based on equation (13).

Table 10: Efficient GMM estimators, Level Regressions

Sample number	78	75	38	37	38	37	38	38	38
s_s	NEWS	POSTAL	NEWS	POSTAL	NEWS	POSTAL	NEWS	NEWS	NEWS
instruments									
baseline†	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cook's WWII			yes	yes	yes	yes	yes	yes	yes
s_k					yes	yes	yes	yes	yes
s_h							yes		yes
s_s								yes	
$n+g+\delta$									yes
coefficients									
(White SEs)									
constant	9.49	9.54	8.78	10.16	8.98	10.13	9.02	9.19	9.02
	(0.21)	(0.50)	(0.38)	(0.17)	(0.21)	(0.14)	(0.18)	(0.20)	(0.15)
$\ln \frac{s_k}{n+g+\delta}$	-0.08	-0.14	0.75	-0.31	0.53	-0.28	0.47	0.30	0.48
	(0.25)	(0.33)	(0.47)	(0.15)	(0.24)	(0.13)	(0.19)	(0.22)	(0.15)
$\ln \frac{s_h}{n+g+\delta}$	1.30	1.80	-0.19	0.62	0.48	0.61	0.59	1.11	0.58
	(0.67)	(0.88)	(1.01)	(0.22)	(0.40)	(0.21)	(0.26)	(0.26)	(0.25)
$\ln \frac{s_s}{n+g+\delta}$	0.18	0.02	0.42	0.28	0.26	0.28	0.25	0.11	0.25
	(0.22)	(0.29)	(0.24)	(0.03)	(0.07)	(0.03)	(0.05)	(0.01)	(0.05)
Test Statistics									
(p-values)									
Hansen's J	2.17	1.55	2.49	7.41	9.51	7.40	9.51	14.05	9.50
	(0.53)	(0.67)	(0.96)	(0.49)	(0.39)	(0.60)	(0.48)	(0.17)	(0.58)
Wald for Restriction	0.00	0.05	1.25	2.45	0.00	2.45	0.00	1.22	0.01
	(0.97)	(0.82)	(0.26)	(0.12)	(0.95)	(0.12)	(0.98)	(0.27)	(0.94)
Implied Coefficients									
(White SEs)									
α	-0.03	-0.05	0.38	-0.20	0.24	-0.18	0.21	0.12	0.21
	(0.22)	(0.25)	(0.11)	(0.14)	(0.11)	(0.13)	(0.09)	(0.12)	(0.07)
β	0.54	0.67	-0.10	0.39	0.21	0.38	0.26	0.44	0.25
	(0.13)	(0.11)	(0.65)	(0.08)	(0.17)	(0.08)	(0.10)	(0.07)	(0.09)
γ	0.08	0.01	0.21	0.18	0.11	0.17	0.11	0.04	0.11
	(0.24)	(0.32)	(0.11)	(0.07)	(0.05)	(0.07)	(0.04)	(0.04)	(0.04)

Numbers in parentheses are heteroskedasticity consistent standard errors.

†: All estmations include following baseline instruments: constant, log of are (square km), per worker GDP in 1960, Barro-Lee index in 1960, s_k in 1960, price of investment goods in 1960, price of consumption goods in 1960.

Table 11: Efficient GMM Estimators, Growth Regressions

Sample number	78	75	38	38	38	38	38	38	38
s_s	NEWS	POSTAL	NEWS	POSTAL	NEWS	POSTAL	NEWS	NEWS	NEWS
instruments									
baseline†	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cook's WWII			yes	yes	yes	yes	yes	yes	yes
s_k					yes	yes	yes	yes	yes
s_h							yes		yes
s_s								yes	
$n+g+\delta$									yes
coefficients (White SEs)									
constant	5.90	7.91	5.79	9.02	5.47	9.15	5.79	5.37	6.40
	(2.29)	(3.37)	(2.50)	(1.04)	(1.20)	(1.04)	(0.94)	(0.88)	(0.92)
$\ln y_60$	-0.60	-0.80	-0.67	-0.88	-0.61	-0.90	-0.64	-0.60	-0.71
	(0.24)	(0.39)	(0.28)	(0.10)	(0.13)	(0.10)	(0.10)	(0.09)	(0.10)
$\ln \frac{s_k}{n+g+\delta}$	0.09	-0.16	0.85	-0.21	0.69	-0.18	0.50	0.61	0.56
	(0.36)	(0.31)	(0.38)	(0.18)	(0.20)	(0.18)	(0.19)	(0.20)	(0.18)
$\ln \frac{s_h}{n+g+\delta}$	0.19	1.22	-0.21	0.50	0.01	0.48	0.54	0.40	0.54
	(1.23)	(1.29)	(0.80)	(0.21)	(0.38)	(0.21)	(0.26)	(0.31)	(0.24)
$\ln \frac{s_s}{n+g+\delta}$	0.33	0.11	0.23	0.25	0.18	0.26	0.10	0.09	0.11
	(0.33)	(0.26)	(0.24)	(0.04)	(0.09)	(0.04)	(0.05)	(0.01)	(0.05)
Test Statistics (p-values)									
Hansen's J	0.32	2.16	2.28	7.88	7.41	8.76	10.20	10.42	10.86
	(0.85)	(0.34)	(0.94)	(0.34)	(0.49)	(0.36)	(0.33)	(0.32)	(0.37)
Wald for Restriction	0.31	0.02	0.77	1.18	0.37	1.98	0.38	0.38	2.42
	(0.58)	(0.90)	(0.38)	(0.28)	(0.54)	(0.16)	(0.54)	(0.54)	(0.12)
Implied Coefficients (White SEs)									
α	0.07	-0.08	0.55	-0.15	0.46	-0.12	0.28	0.36	0.29
	(0.37)	(0.46)	(0.16)	(0.18)	(0.09)	(0.17)	(0.12)	(0.13)	(0.10)
β	0.16	0.62	-0.14	0.35	0.01	0.33	0.31	0.24	0.28
	(0.91)	(0.16)	(0.72)	(0.08)	(0.30)	(0.09)	(0.12)	(0.17)	(0.11)
γ	0.27	0.05	0.15	0.18	0.12	0.17	0.06	0.05	0.06
	(0.37)	(0.53)	(0.19)	(0.07)	(0.07)	(0.06)	(0.04)	(0.02)	(0.04)
λ	0.0232	0.0402	0.0274	0.0538	0.0237	0.0580	0.0253	0.0228	0.0309
	(0.0151)	(0.0489)	(0.0208)	(0.0213)	(0.0084)	(0.0248)	(0.0069)	(0.0057)	(0.0083)

Numbers in parentheses are heteroskedasticity consistent standard errors.

†: All estmations include following baseline instruments: constant, log of are (square km), per worker GDP in 1960, Barro-Lee index in 1960, s_k in 1960, price of investment goods in 1960, price of consumption goods in 1960.

Table 12: Quad-Capital Production Function

specification	Level			Growth		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	95.00	74.00	22.00	95.00	74.00	22.00
Constant	8.04	8.55	10.49	4.92	5.72	9.58
	(1.22)	(1.28)	(1.80)	(1.13)	(1.32)	(3.66)
$\ln y_6 0$				-0.50	-0.58	-0.93
				(0.08)	(0.10)	(0.25)
$\ln s_k$	0.17	0.24	0.17	0.27	0.32	0.19
	(0.12)	(0.15)	(0.31)	(0.10)	(0.14)	(0.33)
$\ln s_h$	0.40	0.56	-0.06	0.25	0.33	-0.04
	(0.11)	(0.13)	(0.28)	(0.10)	(0.13)	(0.29)
ln NEWS	0.14	0.17	0.06	0.07	0.11	0.05
	(0.05)	(0.05)	(0.11)	(0.04)	(0.05)	(0.12)
ln POSTAL	0.18	0.12	0.30	0.12	0.10	0.27
	(0.04)	(0.05)	(0.09)	(0.04)	(0.04)	(0.15)
$\ln(n+g+delta)$	-1.41	-1.38	-0.22	-0.74	-0.82	-0.30
	(0.45)	(0.45)	(0.55)	(0.39)	(0.439	(0.63)
R^2	0.85	0.85	0.74	0.62	0.59	0.66
$\bar{R}^2$	0.84	0.83	0.65	0.59	0.55	0.52
s.e.e.	0.47	0.43	0.21	0.40	0.39	0.21
Restricted						
Constant	9.42	9.31	9.87	4.99	5.64	8.97
	(0.13)	(0.17)	(0.27)	(0.69)	(0.86)	(2.22)
$\ln y_6 0$				-0.50	-0.59	-0.91
				(0.08)	(0.10)	(0.23)
$\ln \frac{s_k}{n+g+\delta}$	0.19	0.25	0.10	0.27	0.32	0.16
	(0.12)	(0.15)	(0.24)	(0.10)	(0.13)	(0.27)
$\ln \frac{s_h}{n+g+\delta}$	0.39	0.57	-0.09	0.25	0.33	-0.05
	(0.11)	(0.13)	(0.26)	(0.10)	(0.13)	(0.28)
$\ln \frac{NEWS}{n+g+\delta}$	0.14	0.18	0.07	0.07	0.11	0.06
	(0.05)	(0.05)	(0.10)	(0.04)	(0.05)	(0.11)
$\ln \frac{POSTAL}{n+g+\delta}$	0.19	0.13	0.30	0.12	0.10	0.26
	(0.04)	(0.05)	(0.08)	(0.03)	(0.04)	(0.13)
R^2	0.84	0.85	0.73	0.62	0.59	0.66
$\bar{R}^2$	0.84	0.83	0.65	0.59	0.55	0.52
s.e.e.	0.47	0.43	0.20	0.39	0.39	0.20
F-stat.	1.29	0.36	0.12	0.01	0.01	0.05
p-value	0.26	0.55	0.73	0.94	0.93	0.83
implied λ				0.0174	0.0220	0.0595
				(0.0039)	(0.0057)	(0.0617)
share of K	0.10	0.12	0.07	0.22	0.22	0.12
	(0.06)	(0.07)	(0.15)	(0.07)	(0.09)	(0.20)
share of H	0.21	0.27	-0.06	0.20	0.23	-0.04
	(0.05)	(0.05)	(0.21)	(0.07)	(0.07)	(0.23)
share of NEWS	0.07	0.08	0.06	0.06	0.07	0.04
	(0.03)	(0.03)	(0.08)	(0.04)	(0.04)	(0.09)
share of POSTAL	0.10	0.06	0.22	0.10	0.07	0.20
	(0.03)	(0.03)	(0.05)	(0.04)	(0.05)	(0.07)

Standard errors are in parentheses

Table 13: Level Regressions for 1960–2000, Saving Rate of Social Capital: *Groups*

	PWT 6.1 (1960-2000)					(Group)		(O-Group)		(P-Group)	
sample	Non Oil	Int.	OECD	Sample	OECD	Sample	OECD	Sample	OECD	Sample	OECD
# of obs	99	76	23	33	20	33	20	33	20	33	20
constant	4.98	6.04	10.19	5.52	12.03	5.68	11.32	5.60	11.59	5.72	12.29
	(1.26)	(1.29)	(2.55)	(1.59)	(1.64)	(1.64)	(1.27)	(1.58)	(1.86)	(1.62)	(1.82)
$\ln s_k$	0.48	0.59	0.54	0.28	0.45	0.28	0.30	0.25	0.37	0.24	0.50
	(0.12)	(0.14)	(0.41)	(0.16)	(0.26)	(0.16)	(0.20)	(0.16)	(0.29)	(0.17)	(0.30)
$\ln s_h$	0.82	0.88	0.57	1.03	1.27	1.05	0.62	1.06	1.22	1.07	1.31
	(0.10)	(0.13)	(0.37)	(0.14)	(0.27)	(0.14)	(0.28)	(0.14)	(0.30)	(0.14)	(0.30)
$\ln s_s$						0.05	0.23	0.08	0.03	0.06	-0.02
						(0.09)	(0.06)	(0.07)	(0.05)	(0.08)	(0.06)
$\ln(n+g+\delta)$	-2.78	-2.53	-0.84	-2.70	-0.71	-2.70	-0.55	-2.75	-0.80	-2.70	-0.65
	(0.44)	(0.43)	(0.77)	(0.50)	(0.48)	(0.51)	(0.37)	(0.50)	(0.52)	(0.50)	(0.52)
R^2	0.78	0.79	0.30	0.89	0.70	0.89	0.84	0.89	0.70	0.89	0.70
$\bar{R}^2$	0.78	0.78	0.18	0.87	0.64	0.87	0.79	0.87	0.62	0.87	0.62
s.e.e.	0.55	0.50	0.31	0.36	0.19	0.36	0.15	0.36	0.20	0.36	0.20
Restricted Reg											
constant	8.82	8.76	9.51	9.10	9.55	9.09	9.90	9.13	9.65	9.17	9.58
	(0.11)	(0.13)	(0.39)	(0.16)	(0.26)	(0.16)	(0.21)	(0.16)	(0.27)	(0.18)	(0.29)
$\ln \frac{s_k}{n+g+\delta}$	0.59	0.70	0.47	0.45	0.22	0.43	0.16	0.42	0.17	0.39	0.21
	(0.12)	(0.14)	(0.31)	(0.15)	(0.22)	(0.15)	(0.16)	(0.15)	(0.22)	(0.16)	(0.23)
$\ln \frac{s_h}{n+g+\delta}$	0.86	0.96	0.55	1.15	1.12	1.17	0.49	1.18	1.08	1.19	1.11
	(0.10)	(0.13)	(0.34)	(0.13)	(0.26)	(0.14)	(0.26)	(0.13)	(0.26)	(0.14)	(0.27)
$\ln \frac{s_s}{n+g+\delta}$						0.09	0.24	0.08	0.05	0.08	0.02
						(0.10)	(0.06)	(0.07)	(0.04)	(0.08)	(0.06)
R^2	0.76	0.78	0.29	0.86	0.66	0.87	0.82	0.87	0.68	0.87	0.66
$\bar{R}^2$	0.78	0.78	0.18	0.87	0.64	0.87	0.79	0.87	0.62	0.87	0.62
s.e.e.	0.58	0.51	0.30	0.38	0.20	0.38	0.15	0.38	0.20	0.38	0.20
F-stat.	9.35	4.46	0.07	5.12	2.33	4.34	1.31	5.00	1.12	4.54	2.26
p-value	0.00	0.04	0.79	0.03	0.15	0.05	0.27	0.03	0.31	0.04	0.15
Implied α	0.24	0.26	0.23	0.17	0.10	0.16	0.09	0.16	0.07	0.15	0.09
	(0.05)	(0.05)	(0.14)	(0.05)	(0.09)	(0.06)	(0.10)	(0.06)	(0.12)	(0.07)	(0.13)
Implied β	0.35	0.36	0.27	0.44	0.48	0.43	0.26	0.44	0.47	0.45	0.48
	(0.04)	(0.04)	(0.15)	(0.05)	(0.09)	(0.03)	(0.11)	(0.03)	(0.07)	(0.04)	(0.07)
Implied γ						0.03	0.13	0.03	0.02	0.03	0.01
						(0.04)	(0.06)	(0.03)	(0.05)	(0.03)	(0.06)

Standar errors are in parentheses.

Table 14: Growth Regressions for 1960–2000, Saving Rate of Social Capital: *Groups*

	PWT 6.1 (1960–2000)			Rstricted sample		(Group)		(O-Group)		(P-Group)	
sample	Non Oil	Int.	OECD	Sample	OECD sample	Sample	OECD sample	Sample	OECD sample	Sample	OECD sample
# of obs	99	76	23	33	20	33	20	33	20	33	20
constant	2.55	3.16	3.98	2.07	7.54	1.93	8.10	2.20	7.24	2.19	7.79
	(1.01)	(1.18)	(2.27)	(1.43)	(1.39)	(1.52)	(1.65)	(1.46)	(1.49)	(1.49)	(1.48)
$\ln y60$	-0.39	-0.45	-0.48	-0.56	-0.63	-0.55	-0.69	-0.57	-0.63	-0.57	-0.63
	(0.08)	(0.10)	(0.11)	(0.10)	(0.07)	(0.10)	(0.12)	(0.10)	(0.08)	(0.10)	(0.08)
$\ln s_k$	0.47	0.58	0.38	0.18	0.32	0.18	0.31	0.17	0.27	0.17	0.37
	(0.09)	(0.12)	(0.29)	(0.12)	(0.17)	(0.13)	(0.17)	(0.12)	(0.19)	(0.13)	(0.19)
$\ln s_h$	0.42	0.43	0.18	0.64	0.89	0.63	0.79	0.66	0.85	0.66	0.93
	(0.09)	(0.13)	(0.27)	(0.14)	(0.19)	(0.14)	(0.25)	(0.14)	(0.20)	(0.15)	(0.20)
$\ln s_s$						-0.03	0.06	0.03	0.02	0.02	-0.02
						(0.08)	(0.09)	(0.05)	(0.03)	(0.06)	(0.04)
$\ln(n+g+\delta)$	-1.31	-1.36	-0.91	-2.10	-0.70	-0.21	-0.66	-2.14	-0.77	-2.11	-0.64
	(0.39)	(0.41)	(0.54)	(0.41)	(0.31)	(0.41)	(0.32)	(0.42)	(0.33)	(0.41)	(0.32)
R^2	0.56	0.51	0.57	0.70	0.85	0.70	0.85	0.70	0.85	0.70	0.85
$\bar{R}^2$	0.54	0.48	0.48	0.66	0.81	0.65	0.80	0.65	0.80	0.65	0.80
s.e.e.	0.42	0.42	0.22	0.27	0.12	0.28	0.12	0.28	0.12	0.28	0.12
Implied λ	0.0122	0.0148	0.0165	0.0207	0.0250	0.0202	0.0294	0.0213	0.0252	0.0209	0.0250
	(0.0031)	(0.0043)	(0.0055)	(0.0054)	(0.0051)	(0.0056)	(0.0097)	(0.0058)	(0.0052)	(0.0057)	(0.0052)
Restricted Reg											
constant	3.41	3.88	4.90	5.26	6.09	5.30	6.79	5.39	6.26	5.38	6.09
	(0.60)	(0.78)	(1.04)	(0.90)	(0.67)	(0.94)	(1.18)	(0.93)	(0.68)	(0.93)	(0.71)
$\ln y60$	-0.36	-0.42	-0.49	-0.55	-0.61	-0.55	-0.68	-0.56	-0.62	-0.56	-0.61
	(0.07)	(0.09)	(0.11)	(0.11)	(0.07)	(0.11)	(0.12)	(0.11)	(0.07)	(0.11)	(0.08)
$\ln \frac{s_k}{n+g+\delta}$	0.50	0.61	0.47	0.34	0.21	0.34	0.19	0.33	0.17	0.31	0.21
	(0.09)	(0.11)	(0.22)	(0.12)	(0.14)	(0.12)	(0.14)	(0.12)	(0.14)	(0.13)	(0.15)
$\ln \frac{s_h}{n+g+\delta}$	0.41	0.43	0.22	0.74	0.80	0.74	0.06	0.76	0.78	0.77	0.80
	(0.09)	(0.13)	(0.25)	(0.14)	(0.18)	(0.15)	(0.23)	(0.14)	(0.17)	(0.15)	(0.18)
$\ln \frac{s_s}{n+g+\delta}$						0.01	0.06	0.04	0.03	0.04	-0.01
						(0.08)	(0.09)	(0.06)	(0.03)	(0.07)	(0.04)
R^2	0.56	0.50	0.57	0.62	0.83	0.62	0.84	0.63	0.85	0.63	0.83
$\bar{R}^2$	0.54	0.48	0.48	0.66	0.81	0.65	0.80	0.65	0.80	0.64	0.80
s.e.e.	0.42	0.41	0.21	0.30	0.12	0.31	0.13	0.31	0.12	0.31	0.13
F-stat.	1.13	0.67	0.21	7.33	1.42	7.18	1.25	7.09	0.55	6.77	1.68
p-value	0.29	0.42	0.64	0.01	0.25	0.01	0.28	0.01	0.47	0.01	0.22
Implied λ	0.0111	0.0138	0.0170	0.0199	0.0237	0.0202	0.0285	0.0207	0.0245	0.0205	0.0237
	(0.0028)	(0.0040)	(0.0054)	(0.0058)	(0.0047)	(0.0061)	(0.0094)	(0.0062)	(0.0049)	(0.0061)	(0.0049)
implied α	0.39	0.42	0.40	0.21	0.13	0.20	0.12	0.19	0.11	0.19	0.13
	(0.07)	(0.08)	(0.17)	(0.07)	(0.08)	(0.09)	(0.11)	(0.09)	(0.11)	(0.09)	(0.12)
Implied β	0.32	0.30	0.18	0.45	0.50	0.45	0.43	0.45	0.49	0.46	0.50
	(0.06)	(0.07)	(0.19)	(0.06)	(0.08)	(0.05)	(0.10)	(0.04)	(0.06)	(0.05)	(0.06)
Implied γ						0.01	0.04	0.02	0.02	0.03	-0.00
						(0.06)	(0.10)	(0.05)	(0.05)	(0.05)	(0.06)

Standar errors are in parentheses.

Table 15: First Difference Regressions for the Level Regression, Saving Rate for Social Capital: *NEWS*

	$Y = K^{\alpha}(AL)^{1-\alpha}$			$Y = K^{\alpha}H^{\beta}(AL)^{1-\alpha-\beta}$			$Y = K^{\alpha}S^{\gamma}(AL)^{1-\alpha-\gamma}$			$Y = K^{\alpha}H^{\beta}S^{\gamma}(AL)^{1-\alpha-\beta-\gamma}$		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	95	76	23	95	76	23	95	76	23	95	76	23
$\ln s_k$	0.20	0.28	-0.37	0.22	0.40	0.08	0.20	0.27	-0.43	0.22	0.40	0.02
	(0.10)	(0.13)	(0.48)	(0.09)	(0.13)	(0.35)	(0.10)	(0.13)	(0.49)	(0.09)	(0.13)	(0.35)
$\ln s_h$				0.15	0.20	0.98				0.15	0.21	0.98
				(0.05)	(0.06)	(0.21)				(0.05)	(0.06)	(0.21)
$\ln s_s$							0.11	0.10	-0.54	0.06	-0.02	-0.49
							(0.10)	(0.15)	(0.57)	(0.09)	(0.15)	(0.40)
$\ln(n+g+\delta)$	-1.76	-1.88	-2.47	-2.18	-2.06	-2.02	-1.83	-1.91	-2.28	-2.21	-2.06	-1.85
	(0.47)	(0.54)	(1.16)	(0.47)	(0.51)	(0.82)	(0.47)	(0.54)	(1.18)	(0.47)	(0.52)	(0.82)
s.e.e.	0.38	0.37	0.40	0.36	0.34	0.28	0.38	0.37	0.40	0.36	0.35	0.28
Restricted Reg												
$\ln \frac{s_k}{n+g+\delta}$	0.27	0.37	-0.05	0.29	0.50	0.21	0.27	0.36	-0.05	0.29	0.49	0.21
	(0.10)	(0.13)	(0.51)	(0.10)	(0.13)	(0.33)	(0.10)	(0.13)	(0.53)	(0.10)	(0.13)	(0.33)
$\ln \frac{s_h}{n+g+\delta}$				0.12	0.22	1.07				0.11	0.21	1.09
				(0.05)	(0.06)	(0.19)				(0.05)	(0.07)	(0.19)
$\ln \frac{s_s}{n+g+\delta}$							0.12	0.19	-0.03	0.09	0.05	-0.31
							(0.10)	(0.16)	(0.60)	(0.10)	(0.16)	(0.38)
s.e.e.	0.40	0.38	0.44	0.39	0.36	0.28	0.40	0.38	0.45	0.39	0.36	0.28
F-stat.	10.54	8.20	5.68	14.96	7.63	1.06	10.17	7.08	6.52	14.36	7.42	1.92
p-value	0.00	0.01	0.03	0.00	0.01	0.32	0.00	0.01	0.02	0.00	0.01	0.18
Implied α	0.21	0.27	-0.06	0.21	0.29	0.09	0.19	0.23	-0.06	0.19	0.28	0.10
	(0.06)	(0.07)	(0.57)	(0.05)	(0.05)	(0.13)	(0.06)	(0.07)	(0.61)	(0.05)	(0.05)	(0.16)
Implied β				0.08	0.13	0.47				0.07	0.12	0.55
				(0.04)	(0.03)	(0.08)				(0.04)	(0.03)	(0.05)
Implied γ							0.09	0.12	-0.04	0.06	0.03	-0.16
							(0.07)	(0.09)	(0.68)	(0.07)	(0.09)	(0.24)

Standar errors are in parentheses.

Table 16: First Difference Regressions for the Growth Regression, Saving Rate for Social Capital: *NEWS*

	$Y = K^{\alpha}(AL)^{1-\alpha}$			$Y = K^{\alpha}H^{\beta}(AL)^{1-\alpha-\beta}$			$Y = K^{\alpha}S^{\gamma}(AL)^{1-\alpha-\gamma}$			$Y = K^{\alpha}H^{\beta}S^{\gamma}(AL)^{1-\alpha-\beta-\gamma}$		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	95	76	23	95	76	23	95	76	23	95	76	23
$\ln y60$	-0.64	-0.61	-0.41	-0.59	-0.53	-0.53	-0.62	-0.58	-0.2	-0.56	-0.51	-0.53
	(0.06)	(0.06)	(0.09)	(0.06)	(0.08)	(0.14)	(0.06)	(0.06)	(0.09)	(0.08)	(0.08)	(0.14)
$\ln s_k$	0.28	0.42	0.44	0.29	0.39	0.41	0.29	0.44	0.38	0.29	0.41	0.35
	(0.08)	(0.10)	(0.30)	(0.08)	(0.10)	(0.30)	(0.08)	(0.10)	(0.30)	(0.08)	(0.10)	(0.30)
$\ln s_h$				-0.07	-0.10	0.28				-0.07	-0.09	0.27
				(0.06)	(0.07)	(0.27)				(0.06)	(0.07)	(0.26)
$\ln s_s$							-0.08	-0.18	-0.48	-0.09	-0.17	-0.48
							(0.09)	(0.13)	(0.32)	(0.09)	(0.13)	(0.32)
$\ln(n+g+\delta)$	-1.31	-0.98	-0.01	-1.06	-0.73	-0.36	-1.23	-0.88	0.15	-0.94	-0.65	-0.20
	(0.40)	(0.44)	(0.76)	(0.46)	(0.48)	(0.83)	(0.41)	(0.44)	(0.75)	(0.47)	(0.48)	(0.81)
s.e.e.	0.32	0.28	0.23	0.32	0.28	0.23	0.32	0.28	0.22	0.32	0.28	0.22
Implied λ	0.0255	0.0233	0.0134	0.0220	0.0191	0.0188	0.0242	0.0217	0.0135	0.0204	0.0180	0.0188
	(0.0039)	(0.0035)	(0.0038)	(0.0046)	(0.0042)	(0.0075)	(0.0040)	(0.0035)	(0.0037)	(0.0045)	(0.0040)	(0.0072)
Restricted Reg												
$\ln y60$	-0.61	-0.58	-0.44	-0.53	-0.51	-0.55	-0.59	-0.56	-0.42	-0.50	-0.48	-0.53
	(0.06)	(0.05)	(0.07)	(0.07)	(0.07)	(0.12)	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.12)
$\ln \frac{s_k}{n+g+\delta}$	0.33	0.46	0.37	0.32	0.41	0.36	0.33	0.48	0.37	0.33	0.43	0.36
	(0.08)	(0.10)	(0.27)	(0.08)	(0.10)	(0.27)	(0.08)	(0.10)	(0.26)	(0.08)	(0.10)	(0.26)
$\ln \frac{s_h}{n+g+\delta}$				-0.11	-0.11	0.29				-0.12	-0.11	0.27
				(0.06)	(0.07)	(0.26)				(0.06)	(0.07)	(0.25)
$\ln \frac{s_s}{n+g+\delta}$							-0.08	-0.16	-0.49	-0.10	-0.16	-0.47
							(0.09)	(0.13)	(0.30)	(0.09)	(0.12)	(0.29)
s.e.e.	0.33	0.29	0.22	0.32	0.28	0.22	0.33	0.28	0.22	0.32	0.28	0.22
F-stat.	6.32	1.49	0.26	3.60	0.87	0.15	6.22	1.86	0.00	3.36	1.17	0.00
p-value	0.01	0.23	0.62	0.06	0.35	0.70	0.01	0.18	0.97	0.07	0.28	0.95
Implied λ	0.0236	0.0220	0.0145	0.0188	0.0177	0.0201	0.0224	0.0204	0.0136	0.0173	0.0166	0.0044
	(0.0037)	(0.0032)	(0.0032)	(0.0037)	(0.0037)	(0.0069)	(0.0037)	(0.0032)	(0.0030)	(0.0037)	(0.0036)	(0.9479)
Implied α	0.35	0.44	0.46	0.44	0.51	0.30	0.40	0.55	1.23	0.54	0.66	0.53
	(0.06)	(0.06)	(0.19)	(0.09)	(0.09)	(0.19)	(0.09)	(0.12)	(1.29)	(0.08)	(0.08)	(0.41)
Implied β				-0.15	-0.13	0.24				-0.19	-0.16	0.40
				(0.10)	(0.11)	(0.16)				(0.15)	(0.16)	(0.40)
Implied γ							-0.10	-0.19	-1.62	-0.16	-0.24	-0.70
							(0.12)	(0.17)	(2.96)	(0.20)	(0.28)	(0.78)

Standar errors are in parentheses.

Table 17: Robustness Check

	Level with Dummies			Level in RWLS			Growth with Dummies			Growth in RWLS		
sample	Non-Oil	Int.	OECD	Non-Oil	Int.	OECD	Non-Oil	Int.	OECD	Non-Oil	Int.	OECD
# of obs	98	76	23	95	71	17	98	76	23	91	72	13
# of outliers	n.a.	n.a.	n.a.	3	5	6	n.a.	n.a.	n.a.	7	4	10
constant	8.99	9.80	9.12	9.06	8.75	7.58	3.82	4.38	4.56	3.87	3.11	9.16
	(1.29)	(1.29)	(1.89)	(1.29)	(0.96)	(0.73)	(1.36)	(1.88)	(2.18)	(1.01)	(1.13)	(0.21)
$\ln y60$							-0.42	-0.47	-0.56	-0.45	-0.38	-0.80
							(0.07)	(0.13)	(0.14)	(0.07)	(0.10)	(0.01)
$\ln s_k$	0.22	0.29	0.05	0.14	0.58	-1.49	0.28	0.31	0.27	0.19	0.44	0.39
	(0.12)	(0.14)	(0.36)	(0.10)	(0.15)	(0.19)	(0.10)	(0.12)	(0.30)	(0.08)	(0.10)	(0.02)
$\ln s_h$	0.40	0.55	0.12	0.48	0.52	-0.82	0.25	0.24	0.11	0.26	-0.07	0.37
	(0.15)	(0.18)	(0.54)	(0.13)	(0.18)	(0.12)	(0.10)	(0.20)	(0.48)	(0.09)	(0.16)	(0.06)
$\ln s_s$	0.13	0.17	0.31	0.11	0.16	0.41	0.07	0.09	0.09	0.02	0.08	0.06
	(0.05)	(0.07)	(0.11)	(0.04)	(0.05)	(0.06)	(0.03)	(0.03)	(0.09)	(0.04)	(0.03)	(0.01)
$\ln(n+g+\delta)$	-0.70	-0.64	-0.74	-0.65	-1.26	0.18	-0.71	-0.65	-0.87	-0.63	-0.64	-0.30
	(0.53)	(0.53)	(0.63)	(0.53)	(0.34)	(0.21)	(0.42)	(0.43)	(0.40)	(0.35)	(0.36)	(0.07)
Sub-Sahara Africa	-0.23	-0.09		-0.18	0.12		-0.22	-0.24		-0.39	-0.42	
	(0.20)	(0.23)		(0.20)	(0.21)		(0.16)	(0.25)		(0.11)	(0.15)	
Latin America	0.16	0.15		0.19	0.15		-0.12	-0.11		-0.01	-0.11	
	(0.14)	(0.16)		(0.14)	(0.13)		(0.13)	(0.15)		(0.12)	(0.12)	
East Asia	0.39	0.29		0.20	0.10		0.50	0.46		0.40	0.44	
	(0.22)	(0.21)		(0.19)	(0.17)		(0.18)	(0.19)		(0.18)	(0.16)	
OECD	0.90	0.75		1.01	0.40		0.27	0.29		0.51	0.22	
	(0.24)	(0.25)		(0.24)	(0.17)		(0.21)	(0.22)		(0.19)	(0.19)	
R^2	0.85	0.86	0.52	0.87	0.89	0.88	0.66	0.64	0.59	0.75	0.74	1.00
$\bar{R}^2$	0.84	0.84	0.41	0.86	0.87	0.84	0.62	0.59	0.46	0.72	0.70	0.99
s.e.e.	0.47	0.42	0.26	0.43	0.37	0.09	0.38	0.37	0.22	0.29	0.29	0.02
implied λ							0.0139	0.0157	0.0206	0.0150	0.0119	0.0382
							(0.0003)	(0.0007)	(0.0017)	(0.0003)	(0.0005)	(0.0011)
Rest. P-value	0.92	0.52	0.78	0.88	0.99	0.00	0.82	0.97	0.60	0.66	0.64	0.00
implied α	0.12	0.14	0.08	0.08	0.26	4.88	0.28	0.28	0.32	0.21	0.52	0.24
	(0.07)	(0.07)	(0.18)	(0.07)	(0.06)	(7.34)	(0.09)	(0.10)	(0.21)	(0.08)	(0.08)	(0.06)
implied β	0.23	0.27	0.10	0.28	0.23	3.45	0.25	0.21	0.14	0.28	-0.07	0.15
	(0.07)	(0.07)	(0.30)	(0.06)	(0.07)	(6.92)	(0.09)	(0.13)	(0.37)	(0.07)	(0.25)	(0.06)
implied γ	0.08	0.08	0.19	0.06	0.07	-1.87	0.06	0.08	0.07	0.02	0.10	0.05
	(0.04)	(0.05)	(0.08)	(0.03)	(0.04)	(8.34)	(0.04)	(0.05)	(0.12)	(0.07)	(0.07)	(0.03)

α, β and γ are calculated using restricted regressions. White standard errors are in parentheses.

Outlier countries appear in next table.

Table 18: Robustness Check, List of Outlier Countries

sample	Outlier Countries
Non-Oil, Level	Dem. Rep. Congo, Hong Kong, Singapore
Int., Level	Guyana, Jamaica, Tanzania, Zambia, Zimbabwe
OECD, Level	New Zealand, Norway, Portugal, Sweden, Turkey, United Kingdom
Non-Oil, Growth	Botswana, Dem. Rep. Congo, Hong Kong, Mauritius, Nicaragua, Peru, Singapore
Int., Growth	Botswana, Nicaragua, Tanzania, Zambia
OECD, Growth	Canada, Finland, Greece, Ireland, Italy, Luxembourg, New Zealand, Spain, Turkey, United States

Table 19: Level Regressions for 1960–2000, Dependent Variables: Level of GDP per capita

s_s	NEWS			POSTAL		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	98	76	23	96	74	22
constant	5.41	6.77	8.88	7.37	7.82	10.46
	(1.25)	(1.24)	(2.24)	(1.34)	(1.43)	(1.73)
$\ln s_k$	0.37	0.45	0.10	0.25	0.32	0.26
	(0.12)	(0.14)	(0.39)	(0.13)	(0.17)	(0.28)
$\ln s_h$	0.56	0.67	0.14	0.65	0.81	-0.02
	(0.15)	(0.14)	(0.35)	(0.11)	(0.13)	(0.27)
$\ln s_s$	0.21	0.23	0.30	0.23	0.19	0.33
	(0.05)	(0.05)	(0.11)	(0.04)	(0.05)	(0.07)
$n+g+\delta$	-2.33	-2.01	-0.72	-1.71	-1.70	-0.15
	(0.45)	(0.42)	(0.66)	(0.49)	(0.50)	(0.54)
R^2	0.83	0.85	0.50	0.84	0.83	0.72
$\bar{R}^2$	0.82	0.84	0.39	0.83	0.82	0.70
s.e.e.	0.54	0.47	0.27	0.52	0.49	0.21
Restricted Reg						
Constant	8.50	8.47	9.31	8.91	8.82	9.43
	0.12	0.13	0.34	0.15	0.19	0.28
$\ln \frac{s_k}{n+g+\delta}$	0.45	0.51	0.15	0.26	0.33	0.16
	(0.12)	(0.14)	(0.29)	(0.13)	(0.17)	(0.22)
$\ln \frac{s_h}{n+g+\delta}$	0.56	0.70	0.16	0.65	0.83	-0.06
	(0.13)	(0.13)	(0.33)	(0.11)	(0.13)	(0.26)
$\ln \frac{s_s}{n+g+\delta}$	0.23	0.24	0.29	0.25	0.20	0.33
	(0.05)	(0.05)	(0.10)	(0.04)	(0.05)	(0.06)
R^2	0.82	0.84	0.50	0.84	0.83	0.71
$\bar{R}^2$	0.82	0.84	0.39	0.83	0.82	0.70
s.e.e.	0.55	0.47	0.26	0.52	0.49	0.20
F-stat.	6.21	1.91	0.04	1.34	0.51	0.37
p-value	0.01	0.17	0.85	0.25	0.48	0.55
Implied α	0.20	0.21	0.10	0.12	0.14	0.11
	(0.05)	(0.05)	(0.17)	(0.06)	(0.07)	(0.14)
Implied β	0.25	0.29	0.10	0.30	0.35	-0.04
	(0.05)	(0.05)	(0.19)	(0.04)	(0.04)	(0.20)
implied γ	0.10	0.10	0.18	0.11	0.08	0.23
	(0.03)	(0.03)	(0.07)	(0.03)	(0.04)	(0.04)

Standard errors are in parentheses.

Table 20: Growth Regressions for 1960–2000, Dependent Variables: Growth of GDP per capita

s_s	NEWS			POSTAL		
sample	Non Oil	Int.	OECD	Non Oil	Int.	OECD
# of obs	98	76	23	96	74	22
constant	3.77	4.86	5.13	5.03	5.50	9.21
	(1.05)	(1.18)	(2.28)	(1.15)	(1.32)	(3.20)
$\ln y60$	-0.44	-0.56	-0.56	-0.46	-0.52	-0.89
	(0.08)	(0.10)	(0.15)	(0.08)	(0.15)	(0.24)
$\ln s_k$	0.42	0.50	0.29	0.33	0.40	0.28
	(0.10)	(0.13)	(0.34)	(0.11)	(0.15)	(0.29)
$\ln s_h$	0.36	0.42	0.18	0.40	0.47	0.02
	(0.11)	(0.13)	(0.30)	(0.10)	(0.13)	(0.29)
$\ln s_s$	0.12	0.14	0.07	0.14	0.13	0.27
	(0.04)	(0.05)	(0.12)	(0.04)	(0.05)	(0.15)
$\ln(n+g+\delta)$	-0.98	-1.10	-0.67	-0.65	-0.74	-0.24
	(0.42)	(0.43)	(0.56)	(0.43)	(0.48)	(0.59)
R^2	0.61	0.56	0.56	0.61	0.55	0.63
$\bar{R}^2$	0.59	0.53	0.43	0.59	0.52	0.51
s.e.e.	0.44	0.41	0.23	0.43	0.42	0.21
Implied λ	0.0143	0.0205	0.0204	0.0155	0.0183	0.0547
	0.0036	0.0057	0.0086	0.0037	0.0051	0.0528
Restricted Reg						
Constant	3.94	4.91	5.44	4.53	4.95	8.16
	0.61	0.77	1.33	0.65	0.80	1.99
$\ln y60$	-0.43	-0.56	-0.56	-0.47	-0.53	-0.86
	(0.08)	(0.09)	(0.15)	(0.08)	(0.09)	(0.22)
$\ln \frac{s_k}{n+g+\delta}$	0.43	0.50	0.33	0.32	0.40	0.21
	(0.10)	(0.12)	(0.25)	(0.10)	(0.15)	(0.24)
$\ln \frac{s_h}{n+g+\delta}$	0.35	0.42	0.19	0.41	0.47	0.00
	(0.11)	(0.13)	(0.27)	(0.09)	(0.13)	(0.28)
$\ln \frac{s_s}{n+g+\delta}$	0.12	0.14	0.06	0.14	0.12	0.25
	(0.04)	(0.05)	(0.12)	(0.04)	(0.04)	(0.14)
R^2	0.61	0.56	0.56	0.61	0.55	0.62
$\bar{R}^2$	0.59	0.53	0.43	0.59	0.52	0.51
s.e.e.	0.44	0.41	0.22	0.43	0.42	0.21
F-stat.	0.04	0.00	0.03	0.27	0.28	0.18
p-value	0.84	0.95	0.87	0.61	0.60	0.68
Implied λ	0.0140	0.0204	0.0204	0.0161	0.0191	0.0488
	(0.0033)	(0.0053)	(0.0084)	(0.0036)	(0.0050)	(0.0388)
Implied α	0.32	0.31	0.29	0.24	0.26	0.16
	(0.06)	(0.07)	(0.18)	(0.07)	(0.09)	(0.17)
Implied β	0.27	0.26	0.17	0.30	0.31	0.00
	(0.07)	(0.07)	(0.22)	(0.05)	(0.06)	(0.22)
implied γ	0.09	0.09	0.06	0.10	0.08	0.19
	(0.05)	(0.05)	(0.14)	(0.04)	(0.05)	(0.08)

Standard errors are in parentheses.