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THEME: Comparative Economic Development

**SOCIAL CAPITAL AND HUMAN CAPITAL AS INTERACTING
FACTORS OF ECONOMIC DEVELOPMENT: EVIDENCE FROM
EUROPE¹**

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Abstract

Cross-country growth differences can only partly be explained by the differences in physical capital endowment, as it constitutes only a small part of a society's total capital. This paper concentrates on the so-called intangible assets like human and social capital (consisting of networks, norms and trust), which are expected to play significant role in economic development. Because of possible interaction of these two factors, it can be assumed that social capital and human capital influence economic growth not only directly but also via each-other. These hypotheses are tested on the sample of 28 European countries over the period 1999-2007. Main data-sources include World Values Survey, UNESCO and Eurostat. Methodologically, confirmatory factor analysis and regression analysis are used. Preliminary regression results confirm the importance of several cross-effects of human and social capital on economic growth.

Keywords: human capital, social capital, economic development, complementarities, Europe

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1. Introduction

The growth of a society's wealth depends on its total capital, which consists of physical capital, natural resources, human capital and social capital. It has been shown that the share of physical capital constitutes only a small part of a society's total capital. Hence it is important to lay greater emphasis on the role of human and social capital in economic development. The purpose of the current paper is to analyze the reciprocal relationships between human capital and social capital (consisting of networks, civic norms and social trust) as interacting factors of economic development in the sample of European countries. Both factors are assumed to play a significant role in the economic development, measured here by GDP per capita levels and growth rates.

Theoretically, social capital acts like a filter through which human and financial capital flow from the parents and the community to the child, producing better educational outcomes and thus helping to achieve higher wages and status attainment. Higher level of the social capital in the society reduces transaction costs, enables and reinforces collective action, and leads thus to higher welfare levels. Human capital, in turn, affects social capital through educational institutions and average and relative levels of education. Because of possible interaction of these two factors, it can be assumed that social capital and human capital influence economic growth not only directly but also via each-other.

Empirical analysis uses individual-level social capital data from WVS, which are aggregated into limited number of dimensions (it is assumed that different dimensions of social capital may have dissimilar impacts on development) by factor analysis. Macro-level social capital is approximated by governance indicators (World Bank, Kaufmann et al). Data of human capital are taken from UNESCO database. Eurostat is used for retrieving data of economic development, investments and virtual networks. Firstly, different dimensions of social capital are specified using confirmatory factor analysis. Secondly, simple growth regressions are estimated in different specifications, including interaction terms of growth factors.

Rest of the paper is structured as follows. Section 2 presents theoretical background, concentrating on the three issues: (i) general mechanisms how human and social capital influence development outcomes; (ii) definition of the social capital and its components, as used in the current paper; (iii) interaction of social capital with human capital. Section 3 describes indicators used in the empirical analysis. Sections 4 and 5 present the empirical results, while Section 6 concludes.

2. Theoretical background

(i) Shortly about traditional growth models

When studying empirically the differences in levels of income and development between the peoples and countries, it appears that these enormous differences (which are growing all the time) cannot be fully explained by traditional theories of economic growth (Solow 1956, Lucas 1988, Barro 1991, Romer 1990). This could be related to the assumption made in classical and neoclassical economic theory that society consists of a set of independent individuals, each of whom acts to achieve goals that are independently arrived at - implying that the best institution to govern economic exchanges is free market. However, market mechanism based on individually rational behaviour will often not guarantee collectively optimal outcomes because of externalities, solving of which require cooperative behaviour and attitudes. Acknowledging such duality in economic theory has forced economists to look for new explanations to economic processes. Earlier, the concept of human capital was added into endogenous growth models by Romer (1986) and Lucas (1988), and following empirical work has proved that human capital has a strong explanatory power in growth regressions. Human capital creates positive externalities, for example, financial capital does not flow to poor countries with low education levels. Education causes an individual to earn more and to become more productive; therefore a rise in the average level of education of the nation's workforce would be expected to increase national incomes.

Besides human capital, social and institutional resources are also important for ensuring the economic growth and development. This issue was lastly raised in 1990s in the context of conditional convergence theory – it was acknowledged that there are various structural impediments to growth and development, like incomplete property rights, transaction costs, ineffective government policies, weak legal and business institutions, capital market imperfections and cultural differences (Yeager 1999). Most of these development obstacles represent (or are the result of) the lack of social capital. As such, social capital theory is one possibility to find alternative solutions to the problems of allocation, cooperation and economic efficiency, which take into account social context of economic behaviour.

(ii) Conceptualizing of social capital

The relations between social capital and economic development are complicated, partly because of the vagueness and complexity of the first concept. There are different approaches to defining, measuring and applying the concept⁴. In general, social capital includes social relationships and networks together with shared norms and values that facilitate co-operation within or among groups (OECD 2001, World Bank, 2003). At the macro level, social capital refers to the governmental institutions that influence people's ability to cooperate for mutual benefit (Knack 1999). This broader approach to social capital relies on the work of Olson (1982) and North (1990). In more detail, governmental social capital embodies the rule of law, contract enforcement, absence of corruption, transparency in decision-making, an efficient administrative system, a reliable legal system etc - in short, state capability and credibility (Meier, 2002). Based on the above, social capital effects could be analyzed at different levels – micro, meso and macro-level (see Table 1). In addition, distinction is made between structural and cognitive aspects of social capital. *Structural social capital* includes formal and informal

⁴ For alternative definitions of social capital, their comparisons and critics see, for example, Bourdieu (1985), Coleman (1990), Putnam (1993, 2000), Portes (1998), Fine (2001).

structures in the society which mediate the flow of information and other resources, while *cognitive social capital* comprises norms and values as regulators of human behaviour.

Different sub-types of social capital are closely related and can influence each other, being both complements and substitutes. Along cognitive dimension it can be shown how individual informal norms and values influence the behaviour of social groups (as groups are formed from individuals). Moving further to the macro-level we should simply extend group to cover whole society. At the macro level, commonly accepted norms usually transform into formal laws, which in turn influence individual values. Opportunities and constraints created by formal institutions and rules also influence arousal and activities of informal organizations and lobbying-groups, while the latter can induce changes in formal institutions.

Table 1. Dimensions of social capital at micro-, meso- and macro-level

	Micro level	Meso level	Macro level
<i>Structural aspects:</i> facilitate social interaction	Local institutions, formal voluntary networks, informal social ties	Interest groups (trade unions, political parties), firms, corporate citizenship,	Formal state institutions, rules and laws
<i>Cognitive aspects:</i> predispose people to act in a socially beneficial way	Informal norms and values, generalized trust	Group solidarity (potential source of negative social capital)	Governance, corruption, confidence in institutions

Source: Grootaert & Bastelaer (2002), Kaldaru and Tamm (2003: 230).

Most of the empirical work at micro-level has proved that both trust and civic cooperation are associated with stronger economic performance (Putnam 1993, Fukuyama 1995, Helliwell and Putnam 1995, Knack and Keefer 1997, Hjerppe 2000, Zak and Knack 1998, La Porta et al 1997), while the effects of associational activity are more ambiguous. Positive effects of group membership appear mainly at regional level (Putnam 1993, Beugelsdijk and Schaik 2005), while cross-country analyses usually do not show correlation between participation and economic performance (Helliwell 1996, Knack and Keefer 1997). However, Raiser et al (2001) have found that unlike in market economies, in transition countries generalised trust is not positively related to growth, while participation in civic organisations shows a positive correlation. Still, these empirical examples should be taken with caution, especially when comparing with the effect of human capital on development - no country has achieved sustained economic growth without a high level of education, but some highly developed economies have low and arguably declining levels of social capital, measured, for example, through rising crime rates, declining family and kinship cohesion, and falling trust in government and participation in political processes (Grootaert, 1998).

Regarding the causal mechanisms behind the expected positive relationship between micro-level social capital and economic performance, it has been argued that social capital complements the market in its allocation and distribution functions, thus helping to reduce transaction costs. According to Putnam (2000), social networks generated through participation in local associations, voluntary organisations and groups open up channels for the flow of philanthropy and altruism, which, in turn, foster norms of individual and general reciprocity. Social capital thus facilitate economic exchange by reducing transaction costs, as less resources need to be wasted for formal contracts and monitoring. Besides lower transaction costs, social capital also reduces information costs and risk, and helps to avoid moral hazard and adverse selection (Meier 2002). Trust and norms can provide implicit

understanding that discourages opportunistic behaviour, effectively filling the gaps in incomplete contracts and thereby supporting valuable specialized investments (Lyon 2005).

At different phases of development, there might be different optimum combinations of civil and government social capital. Generally, the less the civil (horizontal or micro-level) social capital in the society, the greater is the need for governmental (vertical or macro-level) social capital. In this sense, formal institutions can be both substitutes for – as well as causes of – social trust and civic cooperation. On the other hand it is quite usual to think that economic development and increasing government social capital “crowds out” civil social capital - if development path is supported by solid court system and contract enforcement, then large anonymous markets can be more efficient than informal networks, with gains for all participating economic agents (Grootaert 1998). Some authors, however, argue for synergy. The idea of synergy implies that civic engagement strengthens state institutions and effective state institutions create an environment in which civic engagement is more likely to thrive (Putnam 1993; Evans 1996). As the inter-relationship between civil and government social capital vary along the development process, empirical research on social capital and its effects would be more useful among countries with similar development levels, like European countries in the current study.

(iii) Interaction between HC and SC

A key question for a convincing operationalization of social capital is whether the role of social capital in development processes is most plausibly seen as a separate key production factor, or whether social capital influences the effectiveness of all other production factors. According to the latter, dominating view, various levels of social capital are seen to co-determine the allocation and productivity of basic production factors like physical capital, human capital and technology. (Knorringa and Staveren 2005) In the current paper we are concentrating on the measuring social capital in relation to human capital.

Before discussing the joint effect of these factors on economic development, it should be noted that the concepts of social capital and human capital are closely related. For example, both can be seen as private and public goods which yields appear both to individuals and to the broader society. Human capital and social capital also share the attribute that they are simultaneously consumption goods and investment – both can be seen as an input into the development process, and also as an output of this process (Grootaert, 1998). Education is worth pursuing for its own sake, and a well-educated population is an important outcome of successful development. Likewise, a rich network of civic associations and a well-functioning set of government institutions are worth having, independent of their effect on economic growth. However, despite of these similarities, blurring the distinction between social and human capital – as both to be embodied in people – is not correct. While human capital refers to individuals, social capital refers to connections among individuals and the social networks and the norms of reciprocity that arise from them (Coleman 1990, Putnam 2000). As such, the critical difference between human and social capital is that education and health can be embodied in one individual and can be acquired by one individual regardless of what other people do. Social capital, on the other hand, can by definition only be acquired by a group of people and requires a form of cooperation among them (Grootaert, 1998).

While analysing the similarities and differences between human and social capital, these two factors can be viewed both as opposites and complements (Saraceno, 2002). According to the first argument, human capital (based on individual achievement and competition) is a key for social success whereas social capital has only limited importance for narrow target groups (handicapped, minorities, etc.). The second, dominating approach assumes that social and

human capital reinforce each other's effect on economic growth, social control and support, health, and better governance. An individual's achievements would be higher, if he or she both competed and cooperated with others through different networks and common value systems.

(iv) Joint effect of human and social capital on economic development

It is rather complicated to research human capital and social capital as interacting factors of economic development. First of all, one should keep in mind that causal sequence runs in several directions – from social capital to human capital to economic development; from social capital directly to economic development; from human capital to social capital; and also from economic development to human capital and social capital.

Empirical studies⁵ mainly emphasise the effect of social capital in accumulating human capital. Although traditional models of human capital (e.g. Becker 1962, Ben-Porath 1967, Mincer 1974) focus narrowly on the link between education and income (i.e. economic capital) and do not pay any attention to the possible effects of the other forms of capital, adding social capital to these models enables to study in more detail the questions of how the social networks provide the access to information and thus also help to find better and high-paying jobs (e.g. Loury 1977, Bourdieu 1980, Coleman 1988, Burt 1992). As such, social capital extends an individual's access to human capital and helps to get higher returns from individual's investment to social capital. Social capital is also an important determinant of educational achievement in children. There is considerable evidence to confirm that family, community and state involvement in education improves outcomes by decreasing the probability that the child may drop out of school. Social capital also provides better job opportunities and is positively related to individual's self-reported health, subjective well-being and life satisfaction.

The impact of human capital on social capital is less clear. On the one hand, a general view by proponents of social capital supports the idea that higher levels of education increases social capital. It is even believed that "... the area where governments have the greatest direct ability to generate social capital is education" (Fukuyama 2001: 18). However, the precise mechanism behind this relationship is usually not clearly specified, and thus the causality is not proved. One possible explanation relies on the notion that schools as educational institutions impart good standards of behavior, help to socialize young people and also enable them to engage in society by virtue of being better informed. Offe and Fuchs (2002) suggest that school "...is the first nonfamilial context in an individual's life that trains...moral and cognitive capacities favoring cooperation".

At the more general level it has suggested that both formal and informal education act as mediator of social values and norms between human generations (Montgomery, 1990). However, such value transmission should not always be supportive to social capital generation – education may also foster individualistic and competitive attitudes and hence reduce social capital. Political scientists argue that education would have the effect of raising people's awareness of political issues: the higher literacy caused by greater education might, for example, enable individuals to read political literature and thus to be more aware of current affairs (Rosenstone and Hansen 1993). This tends to raise political activity (i.e. increase macro-level social capital) in the form of higher political participation and voting turnout (Dee 2004, Denny 2003).

⁵ See Parts (2003) for more detailed overview of the studies assessing reciprocal relationship between human and social capital.

Further, there are contradictory opinions concerning the impact of education on individual's propensity to participate in community and voluntary activities. On the one hand, insofar as voluntary activities are altruistic, educated people may be more aware of the deficiencies in society (Denny 2003), but this relationship is not automatic. On the other hand, as higher education is associated with a higher opportunity cost of time, through higher earnings, one could expect a negative effect of education on volunteering (Brown and Lankford 1992). However, since volunteering typically takes place out of work time, there may be little or no trade-off. Finally, the positive correlation between education and voluntary participation could be determined by some omitted variables – for example, some people may simply have more initiative or energy which makes them both more studying and volunteering (Denny 2003).

The argument that education is one of the most important predictors of many forms of political and social engagement is nowadays also challenged by several global developments. Since the second half of 20th century the educational levels in many countries have risen sharply, while levels of political and social participation have not (Putnam 1995, 2000). One explanation to this inconsistency relates to the fact that in the course of rapid developments in technology and individualism, traditional forms of socializing (e.g. face-to-face interactions) are replaced by new types of entertainment (e.g. TV and internet) which are not taken into account in traditional social capital statistics. Yet, this is an important issue for another reason, as investments into human and social capital are also closely related to technological progress. On the one hand, technological progress creates demand for high-qualified labour and increases thus the returns to respective investments. On the other hand, whilst new technologies are often associated with rises in productivity, productive efficiency in turn requires good communication between workgroup members. Such universal competences could be developed and practiced through participation in voluntary organizations and other civic activities (implicitly as well as consciously), implying that human capital is not built within formal educational institutions and frameworks alone. (Schuller 2000)

Taking into account relatively short time span of the current study, it is reasonable to expect the influence of human capital on social capital, but not vice versa, because an opposite impact needs a longer time (almost a generation) to become apparent.

3. Sample description and the measurement of the variables

Empirical analysis includes 28 European countries⁶ over the period 1999-2007. Selection of the period was limited for several reasons. Firstly, for the countries of interest, social capital data were available only for 1999. As the factors of growth should be estimated prior the growth, including earlier years wouldn't be meaningful. Secondly, this period presents pretty stable growth experience without large global shocks (Asian financial crisis and Russian crisis of the years 1997-1998 are excluded), allowing more accurate estimations despite of the short time span. Thirdly, as one of the aims was to test the impact of virtual networks (related to telecommunication and information technology) on economic growth, these data are available only since 2004 and development of these fields also accelerated only since 2000s.

The data⁷ for the following analysis is obtained from several databases. Basic data of economic growth and development are taken from Eurostat (<http://epp.eurostat.ec.europa.eu/>) and include GDP per capital levels in 1999 and 2007, GDP and per capita average annual growth rates over the period 2000-2007, gross capital formation, population growth, export of goods and services, and indicators of the spread of telecommunication and information technology. Human capital is approximated by primary, secondary and tertiary gross enrolment rates as defined and measured by UNESCO (<http://portal.unesco.org/>). Additional human capital measures which are expected to be more directly related to social capital include unemployment rate and early dropout from school.

To measure social capital, many previous studies have used an overall index, one variable or one latent construct (see, for instance, Subramaniam and Youndt, 2005; Ackomak and ter Weel, 2005, 2006). However, it can be assumed that different dimensions of social capital may have dissimilar impacts on development (Franke 2005). Therefore, this paper tests the possible effects of social capital by separate dimensions, including formal and informal networks, civic participation, general trust, institutional trust, institutional quality and social norms. Social capital data come from two databases. Micro-level social capital data are retrieved from WVS – World Values Survey⁸ (<http://www.worldvaluessurvey.org>), which contains standardized cross-national measures of most dimensions of social capital. The last, fourth wave was used, which refers to years 1999-2004 and contains the most complex set of social capital indicators. The initial sample includes about 1000-1500 respondents from every country. Combined weight variable is used in order to correct for deviations from national population parameters in age and education, and it also gives greater weight to the more populous countries so that pooled analysis more closely approximate global reality. Macro-level social capital is measured by six indicators of institutional quality, obtained from the database Governance Matters V: Governance Indicators for 1996-2005 (Kaufmann et al., 2006), and including rule of law, control of corruption, government effectiveness, political stability, regulatory quality, voice and accountability. As these governance indicators are available on bi-annual basis, they are here calculated as average over years 1998 and 2000.

⁶ Countries included are: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

⁷ Detailed descriptions of the indicators can be found in Appendix 1.

⁸ WVS was designed in the beginning of 1980s to enable a cross-European comparison of values and norms on a wide variety of topics and to monitor changes in values and attitudes. Since the second round in 1989 the Survey was extended across the globe by Ronald Inglehart from University of Michigan (US), including data for more than 80 countries. The European coordination centre is located in Tilburg University (the Netherlands).

4. Descriptives and correlations

In order to form measure social capital by separate dimensions, principal component analysis was used. As exploratory analysis confirmed the proposed structure of social capital elements, these factors were next re-estimated with confirmatory analysis. Altogether, eight factors⁹ were constructed, which explained about 49-87% of the variances in initial indicators (see Appendix 2 for details). Country mean factor scores were calculated and are used as composite indicators of social capital in the subsequent analysis. As general trust was measured only by a single survey question, this measure was standardized for future analysis.

Table 2. Correlations between indicators of economic development and its factors

	GDP per capita 1999	GDP per capita 2007	GDP per capita average yearly growth 1999-2007	GDP volume growth index, 2007 (2000=100)
Gross capital formation	,998(**)	,971(**)	-,683(**)	-,516(**)
Gross fixed capital formation	-,402(*)	-,0277	,519(**)	,633(**)
Export index	-,598(**)	-,510(**)	,781(**)	,650(**)
Population growth	,678(**)	,715(**)	-,602(**)	-,420(*)
Unemployment rate	-,652(**)	-,640(**)	,446(*)	,424(*)
Early school leavers	-,141	-,153	-,207	-,138
Primary education	,081	,012	-,179	-,335
Secondary education	,596(**)	,515(**)	-,563(**)	-,433(*)
Tertiary education	0,208	0,129	-0,319	-0,133
General trust	,637(**)	,574(**)	-,484(**)	-0,343
Institutional trust	,792(**)	,767(**)	-,618(**)	-,485(**)
Formal networks	,603(**)	,574(**)	-,472(**)	-0,343
Informal networks	,529(**)	,494(**)	-,534(**)	-,382(*)
Social norms	0,087	0,031	-0,227	-0,322
Political activity	,725(**)	,658(**)	-,668(**)	-,491(**)
Governance	,857(**)	,811(**)	-,821(**)	-,622(**)
Main telephone lines	,814(**)	,760(**)	-,726(**)	-,542(**)
Mobile services	,620(**)	,604(**)	-,511(**)	-0,367
Internet access	,827(**)	,786(**)	-,586(**)	-,375(*)
Computer use	,771(**)	,737(**)	-,476(*)	-0,279
IT expenditures	,526(**)	,475(*)	-0,344	-0,334
Communication expenditures	-,814(**)	-,813(**)	,813(**)	,756(**)

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

A preliminary overview of the relationship between economic performance and its factors, including social capital, is presented in Table 2. As can be see, almost all factors under consideration are statistically significantly correlated with GDP levels and growth rates. As an exception, primary and tertiary education and, school dropout and social norms are not related to any development indicator. In addition, GDP volume growth is not related to general trust,

⁹ However, factors „family“ and „interest in politics“ were excluded from the subsequent analysis, as these were not correlated to other indicators of interest. Later, factor „virtual networks“ was formed on the basis of initial IT indicators and added to social capital elements.

formal networks, spread of mobile services, computer use and IT expenditures (the latter wasn't correlated also with GDP per capita growth).

Concerning the sign of correlations, it appears that three proposed growth factors – gross fixed capital formation, export index and communication expenditures – are negatively related to GDP levels and positively with growth rates. This can be logically explained, as relatively poorer new EU member states have (due to initially low levels) higher need for fixed investments, export growth and expenditures for telecommunication services, which in turn lead to higher growth rates. However, all other growth factors, including social capital, are positively related with GDP levels and negatively with growth, reflecting the fact that respective areas (IT, human and social capital, total investments) are more developed in high-income countries, where growth rates are naturally lower, as explained by convergence theory. Also, population growth shows expectedly negative correlation with GDP per capita and volume growth rates, although its positive correlation with GDP levels is more difficult to explain. The latter result might appear due to the specificity of the sample. On the one hand, population growth in new member states is lower than in old members due to shocks, uncertainty and value changes related to economic transition. On the other hand, these changes in population growth are further reinforced by migration flows from low-income to high-income member states. Unemployment rate is negatively correlated with GDP volume growth and levels, but positively with

Table 3. Correlations between human capital, social capital and IT development.

	General trust	Institutional trust	Formal networks	Informal networks	Political activity	Governance
Population growth	0,300	,653(**)	,375(*)	,416(*)	,477(**)	,694(**)
Unemployment rate	-,404(*)	-,549(**)	-,417(*)	-,377	-,399(*)	-,646(*)
Early school leavers	-,274	0,077	-,090	0,012	-,121	-,066
Primary education	0,023	0,118	-0,040	-0,014	-0,031	0,111
Secondary education	,757(**)	,544(**)	,659(**)	,435(*)	,611(**)	,636(**)
Tertiary education	,440(*)	0,182	0,068	0,283	0,171	0,362
Main telephone lines	,597(**)	,684(**)	,513(**)	,504(**)	,718(**)	,796(**)
Mobile services	,427(*)	0,315	0,292	0,337	,429(*)	,617(**)
Internet access	,752(**)	,824(**)	,687(**)	,457(*)	,706(**)	,854(**)
Computer use	,738(**)	,751(**)	,693(**)	,422(*)	,683(**)	,804(**)
IT expenditures	,555(**)	,506(*)	,558(**)	0,284	,547(**)	,548(**)
Communication expenditures	-,478(*)	-,548(**)	-,502(*)	-,614(**)	-,742(**)	-,739(**)

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 3 addresses possible cross-effects between human capital, social capital¹⁰ and development of information technology. It can be seen that, again, primary education and school dropout are not related to social capital, and tertiary education has statistically significant correlation only with general trust. Unemployment rate is negatively correlated with population growth, general trust and governance. While the two latter facts are in accordance with theory, the first outcome is harder to explain as it contradicts traditional

¹⁰ As social norms were not significantly correlated to any human capital or IT indicator, this factor of social capital is not presented in the Table 3.

understanding that higher population growth leads to higher unemployment because of the deficiency of investments into job creation. However, it seems that in current case the logic runs in opposite direction: high unemployment creates uncertainty about the future, this reduces birth rates and stimulates outward migration, which altogether leads to lower population increase. Further, unemployment is positively (although not significantly) related to school dropout, affirming the logic that finding a job presumes completed education. Similar logic stems from the negative (although again non-significant) correlations with education levels.

Among IT indicators, subscriptions to mobile services are significantly related only to general trust, political activity and governance, but not to institutional trust and networks. Also, as with growth indicators, norms are not related to any human capital and IT indicator. All statistically significant correlations are relatively strong and (logically) positive, indicating possible complementarities between human capital, social capital and IT development, which will be further tested in regression analysis. As an exception, communication expenditures are negatively related to social capital indicators. This may reflect the fact that social capital is stronger in more developed European economies, where telecommunication infrastructure is already developed and current expenditures on it are therefore relatively small; as opposed to new member states where expenditures on telecommunication infrastructure as a percentage of GDP are higher both because higher investment need in this field and lower GDP level.

Additionally, when looking at the relationship between human capital and IT indicators (which can be interpreted as proxies for virtual networks, the latter being a part of social capital which tend to replace to some extent traditional forms of interaction between people), population growth is positively related to internet access, phone and mobile use, but negatively with communication expenditures. Primary and tertiary education and school dropout are not significantly related to any IT indicator, while secondary education shows positive correlations with phone and computer use, internet access and IT expenditures, and negative weaker correlation with communication expenditures. Finally, unemployment is negatively and significantly correlated with most IT elements, except IT and communication expenditures.

Based on the above results, we can clarify the range of possible growth factors concerning the selected sample and time period. Firstly, primary education was excluded from further analysis because it is not related to GDP and social capital, and also because of the low variability of this variable in the sample of developed economies. In addition, as growth is expected to be influenced by the education level of the workforce, primary education can not have an effect in eight-year period. Secondly, norms were excluded because of the lack of correlation with almost all other indicators, and respective literature reveals that norms have turned insignificant in many other empirical studies, too. Thirdly, tertiary education and school dropout rate, which were also mostly uncorrelated to other indicators, were included because of special interest in their effects of social capital on development. Fourthly, IT and communication expenditures were excluded, as the purpose is to study the effect of more intangible assets on economic growth, instead of monetary variables. After that, remaining IT indicators were gathered together into single latent construct using confirmatory factor analysis (see Appendix 2) and named as “virtual networks”. Also, gross investments and export are also not included into most regressions, as these elements can be interpreted as part of the growth itself (especially when considering growth accounting by expenditure method), not so much its predictors.

5. Regression results

We start regression analysis with baseline model including only traditional growth factors (model 1). All variables have been taken in natural logarithms.¹¹ As can be seen from Table 4, gross investments (CAP) and export have the strongest positive influence on GDP per capita growth rate, while the negative coefficient of initial GDP per capita (or so-called catch-up term) indicates ongoing income convergence among EU countries. However, population growth doesn't perform as expected by theory – it has weak positive but insignificant effect on growth, although correlation analysis revealed significant negative relationship between these factors. Backward elimination of insignificant predictors improves the significance levels of the included indicators, but basic parameters of the model (1) don't change much.

Table 4. Regression results of the growth models without interaction terms.
Dependent variable: GDP per capita average yearly growth rate 1999-2007.

Predictors	Model 1	Model 2	Model 3A	Model 3B	Model 4
Constant	-1,957 (3,094)	-0,542 (3,291)	2,261*** (0,150)	2,068***	10,319*** (3,410)
lnGDPpc99	-0,452*** (0,134)	-0,372*** (0,085)	-	-	-
lnCAPavr	1,106** (0,478)	0,941** (0,411)	-	-	-
lnEXPindx	0,949** (0,394)	0,819* (0,422)	-	-	-
lnPOPgyear	0,141 (0,178)	ns	-	-	ns
Insecondary	-	ns	-	-	-1,540* (0,743)
Intertiary	-	-0,248* (0,144)	-	-	ns
Indropout	-	-	-	-	-0,357** (0,166)
Ingentrust	-	-	-0,163 (0,480)	ns	ns
lninstrust	-	-	-0,345 (0,377)	-0,821*** (0,246)	ns
lninformal	-	-	0,802* (0,420)	0,704* (0,372)	ns
lninformal	-	-	-0,518 (0,438)	ns	ns
lnpolact	-	-	-1,013** (0,370)	-1,355*** (0,323)	-0,866*** (0,243)
lngovern	-	-	-0,694* (0,384)	ns	-0,716** (0,310)
lnvirtual	-	-	0,380 (0,272)	ns	0,486** (0,226)
Adjusted R ²	0,826	0,861	0,655	0,641	0,741
F-statistic	33,101***	39,599***	6,940***	15,878***	13,032***
Durbin-Watson	2,038	2,041	1,700	1,502	1,997

* Significant at level $p < 0,10$ ** $p < 0,05$ *** $p < 0,01$. Standard errors in parenthesis.

¹¹ In case of possible negative values of the initial variables (some growth rates and components obtained by factor analysis), log values are calculated as $\ln(\text{initial value} + \text{const})$.

When indicators of education were included into initial model, only tertiary education proved significant (after backward deletion of population growth and secondary education). Also, Table 4 (model 2) shows that the effect of education on growth is negative, which is surprising but in accordance with previous correlation results. The explanation might be that countries with faster growth have lower initial income level, which in turn associates with lower educational levels. However, in model specification (not showed in the table) where all human capital elements are added as growth predictors to the baseline model, only secondary education remains significant, but its sign is also negative.

In the next model specification, all social capital elements are added as growth predictors without traditional growth factors of baseline model (model 3A).¹² As proposed by correlation analysis, most effects are negative, but only the effect of political action and governance turn out to be significant. Surprisingly, significant effect of formal networks is positive, although respective correlation was negative – this result confirms Putnam’s argument about the importance of formal participation, although in current case this doesn’t lead to higher trust as Putnam expected. When reducing the last model by backward method, some changes take place: the effect of governance turns insignificant and, instead, the effect of institutional trust appears to have strong negative impact on growth (see model 3B). These results, again, can be explained by the particularity of the sample – in the EU, higher growth rates appear in new member states due to convergence process; in the same time these countries are characterized by low levels of social capital because of communist past, underdevelopment of democracy and uncertainties created by transition processes. This leads to the situation where fast growth is associated with low trust in formal institutions and with overall feeling of the people that they can’t influence politics.

The last specification in Table 4 including both human capital and social capital indicators (model 4) gives some interesting results, which can be used in the next part of the paper for identifying possible cross-effect of human and social capital. We can see that now secondary education appears to have strong significant effect on GDP growth. As in previous models, political activity and quality of governance remain significant with negative coefficients. In addition, virtual networks have positive effect on growth, indicating empirically the importance of IT technology for economic development. Finally, in model 4 school dropout rate shows significant negative relation with GDP growth, which should be logical in mature economies where it is difficult to be employed in sectors with high value-added when education is incomplete.

Next we are testing several possible cross-effects of social capital and human capital, as predicted by theory. Yet, empirical work on this question is rare. There is a current study by Miguélez and Moreno (2008) testing cross effect of social and human capital on the number of patents (Spanish regional data). However, they found no direct positive effect of interaction term; instead, including the cross-effect into model increased the separate direct effects of human and social capital on patenting activity.

In our case, the indirect effect of social capital on per capita growth is tested, as social capital is expected to reinforce the effect of human capital. For that purpose, interaction terms between social and human capital elements are included into regression models. The results are presented in Table 5, where model (51) shows only the effect of human capital without interaction terms. We can see that the only significant human capital indicators are population

¹² If initial GDP per capita was also included as independent variable, all social capital variables turned insignificant.

growth and secondary education, which both associate with lower GDP per capita growth rates. However, picture changes if we take into account possible cross-effects.

Table 5. Regression results of the growth models including interaction terms.
Dependent variable: GDP per capita average yearly growth rate 1999-2007 (standardized regression coefficients)

Predictors HC=	Model 5 none	Model 6 unemployment	Model 7 dropout	Model 8 secondary	Model 9 tertiary
lnPOPgyear	-,448***	ns	ns	ns	ns
lnsecondary	-,504***	-,304**	-,489***		-,267*
Intertiary	ns	ns	ns	ns	ns
lnunemployment	ns	ns	ns	ns	ns
lndropout	ns	-,271**	-,278**	-,296**	-,280**
GenTrust*HC	-	ns	ns	ns	ns
Instruct*HC	-	-,289**	ns	ns	ns
Formal*HC	-	ns	ns	ns	ns
Informal*HC	-	ns	ns	ns	ns
Polact*HC	-	-,542***	-,519***	-,439***	-,525***
Govern*HC	-	ns	ns	-,529***	-,945*
Virtual*HC	-	ns	ns	ns	0,761* ns
Adjusted R ²	0,639	0,780	0,701	0,727	0,755
F-statistic	20,475***	19,595***	17,424***	13,913***	13,032***

* Significant at level $p < 0,10$ ** $p < 0,05$ *** $p < 0,01$

Next models (2) – (5) include one-by-one social capital cross effects with unemployment, school dropout, secondary education and tertiary education. Generalized results show that in all these models, the only significant single human capital indicators are secondary education (with exception in model 8) and school dropout, while amongst interaction terms the only significant in all models is the cross-effect with political action. In addition, unemployment has cross-effect with institutional trust, enrolment in secondary and tertiary education with governance and tertiary education also with virtual networks. The latter effect is positive, while all other direct and indirect effects are negative. Altogether, the results indicate the importance to reduce unemployment and school dropout rate at secondary level in order to achieve growth through social capital. On the other hand, stimulating the political activity and improving the quality of governance could help to foster positive effects of human capital. Finally, it appears that development of the IT sector (measured by spread of telephone and mobile services, internet access and computer use) has positive effect on economic growth only in combination with the enrolment in tertiary education.

5. Conclusions

Systematic theorizing about human capital and especially social capital as factors of economic development is comparatively recent. Human capital is related to good education and strong health, which make people economically more productive. Social capital, broadly defined as the norms and networks that enable collective action, also affects productivity. At the microeconomic level, this is seen primarily through the ways in which social capital improves the functioning of markets. At the macroeconomic level, institutions, legal frameworks, and the government's role in organizing production are seen as affecting macroeconomic performance.

It is rather complicated to research human capital and social capital as interacting factors of economic development. Empirical studies of the relationship between human and social capital mainly emphasise the effect of social capital in accumulating human capital. Theoretically, human capital is influenced mainly by civil social capital. Social capital is an important determinant of educational achievement in children - there is considerable evidence to confirm that family, community and state involvement in education improves outcomes by decreasing the probability that the child may drop out of school. As current study was rather short-run, such inter-generational effects couldn't appear. However, our results indicate that macro-level social capital might have positive effect on human capital via reducing school dropout and unemployment. Also, the spread of virtual networks seems to have positive effect on growth in countries with higher enrolment in tertiary education.

The impact of human capital on social capital is less clear. At the micro level it has been found that higher education associates with people's political activity and volunteering. Educational institutions are also important transmission channels of norms and values between generations. At the macro level it has suggested that society's average level of education affects generalised trust, while participation activity is more influenced by relative level of education. Unfortunately, our study didn't find significant cross-effect of human and social capital on economic growth, although correlation analysis indicated positive effect of secondary education and higher employment on social capital. This question should be further addressed in more long-run studies and in the labour market context.

Concerning future research, it might be useful to analyze separately old and new EU members (or in broader context, transition and non-transition European countries), as the relationship between economic growth and its factors seems to be different in these two country groups. This assumes also larger sample and, if possible, also analysing longer time period (which might be difficult because of the lack of earlier cross-national social capital data). In addition, regional-level analysis could give some new insights into the research question, as confirmed by some previous studies.

6. References

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Appendix 1. Indicators used in the empirical analysis

Abbreviation	Indicator	Measurement unit	Source
	<i>Economic growth and development</i>		
<i>GDPpc99</i>	Gross domestic product at market prices, 1999	Euro per inhabitant	Eurostat
<i>GDPpc07</i>	Gross domestic product at market prices, 2007	Euro per inhabitant	
<i>GDPpcgY9</i>	GDP per capita yearly growth, 1999-2007 (Euros)	average yearly percentage change, GDP in Euros	Eurostat/own calculations
<i>PPSpc99</i>	Gross domestic product at market prices, 1999	PPS per inhabitant	Eurostat
<i>GDPgyear</i>	Average yearly growth rate of GDP volume 2000-2007	average yearly percentage change	Eurostat/own calculations
<i>GDPin07</i>	Gross domestic product at market prices, 2007	Index, 2000=100	Eurostat
<i>valuead</i>	Gross value added (at basic prices)	Index, 2000=100	Eurostat
	<i>Traditional factors of economic growth</i>		
<i>CAPavr</i>	Gross capital formation	Percentage of GDP, average 1999-2007	Eurostat
<i>CAPFavr</i>	Gross fixed capital formation	Percentage of GDP, average 1999-2007	Eurostat
<i>EXPindx</i>	Exports of goods and services	Index, 2000=100	Eurostat
<i>POPgyear</i>	Population change	Crude rate of increase, average 2000-2007	Eurostat/own calculations
	<i>IT development</i>		
<i>telephon</i>	Number of main telephone lines	Per 100 inhabitants, average 1996-2006	Eurostat
<i>mobile</i>	Subscriptions to cellular mobile services	Per 100 inhabitants, average 1996-2006	Eurostat
<i>INTERavr</i>	Level of Internet access of households	Percentage of households, average 2004-2007	Eurostat/own calculations
<i>COMPavr</i>	Individuals who used a computer in the last 3 months	Percentage of all individuals, average 2004-2007	Eurostat
<i>Itexpavr</i>	Information Technology Expenditure	Percentage of GDP, average 2004-2006	Eurostat/own calculations
<i>COMexpavr</i>	Communications Expenditure	Percentage of GDP, average 2004-2006	Eurostat/own calculations
	<i>Indicators fo human capital</i>		
<i>primary</i>	Enrolment in primary education	Gross enrolment ratio by ISCED level 1	UNESCO
<i>secondar</i>	Enrolment in secondary education	Gross enrolment ratio by ISCED level 2-3	UNESCO
<i>tertiary</i>	Enrolment in tertiary education	Gross enrolment ratio by ISCED levels 5-6	UNESCO
<i>unempl</i>	Unemployment rate	Unemployed persons as a percentage of the labour force.	UNESCO
<i>dropout</i>	Early school leavers	Percentage of the population aged 18-24 with at most lower secondary education	Eurostat/EU Labour Force Survey

Appendix 2. Confirmatory factor analysis of social capital components

Latent factors of social capital	Indicator	Factor loadings	Variance explained (%)
General trust	Most people can be trusted (1) rather than you need to be very careful in dealing with people (0)	Z-score	
Institutional trust	Confidence in parliament, scale 1-4	0.81	60.20
	Confidence in the civil services, scale 1-4	0.79	
	Confidence in the police, scale 1-4	0.76	
	Confidence in the justice system, scale 1-4	0.75	
Formal networks	Belonging into voluntary organizations, number of organizations mentioned, scale 0-16	0.89	79.23
	Unpaid work for voluntary organizations, number of organizations mentioned, scale 0-16	0.89	
Informal networks	Frequency of spending time with friends, scale 1-4	0.81	52.95
	Friends important in life, scale 1-4	0.68	
	Spending time with colleagues from work, scale 1-4	0.68	
Civic norms	Cheating on taxes if you have a chance, not justified, scale 1-10	0.80	57.98
	Claiming government benefits to which you are not entitled, not justified, scale 1-10	0.76	
	Someone accepting a bribe in the course of their duties, not justified, scale 1-10	0.72	
Interest in politics	Frequency of discussing political matters, scale 1-3	0.81	60.33
	Politics important in life, scale 1-4	0.78	
	Frequency of following politics in the news, scale 1-5	0.74	
Political action	Attending lawful demonstrations, scale 1-3	0.80	64.13
	Joining in boycotts, scale 1-3	0.80	
	Signing a petition, scale 1-3	0.80	
Family	Prepared to help immediate family, scale 1-4	0.77	48.50
	Concerned with immediate family, scale 1-4	0.72	
	Family important in life, scale 1-4	0.58	
Governance	Rule of law, scale -2.5 to +2.5	0.97	87.37
	Control of corruption, scale -2.5 to +2.5	0.97	
	Government effectiveness, scale -2.5 to +2.5	0.97	
	Political stability, scale -2.5 to +2.5	0.91	
	Regulatory quality, scale -2.5 to +2.5	0.90	
	Voice and accountability, scale -2.5 to +2.5	0.88	
Virtual networks	Internet access	0.95	72.18
	Computer use	0.91	
	Number of main telephone lines	0.88	
	Subscriptions to cellular mobile services	0.63	

* Scales are chosen so that higher values refer to higher stock of social capital

** Mostly social capital data refer to year 1999 (Macedonia 2001, Finland 2000). Spread of virtual networks is measured as average over period 1999-2006 (telephone and mobile services) and 2004-2007 (internet access and computer use).

Appendix 3. Country mean factor scores of social capital

Country	General trust	Institutional trust	Formal networks	Informal networks	Social norms	Political action	Governance	Virtual networks
Austria	0,06	0,35	0,23	0,05	0,20	0,10	0,75	0,32
Belgium	-0,01	-0,17	0,42	0,00	-0,22	0,36	0,12	0,15
Bulgaria	-0,09	-0,42	-0,37	0,14	0,28	-0,46	-1,67	-1,43
Croatia	-0,28	-0,20	-0,16	0,29	0,24	0,23		
Czech Republic	-0,16	-0,52	0,07	-0,14	0,12	0,25	-0,54	-0,54
Denmark	0,76	0,57	0,47	0,26	0,50	0,49	0,99	1,43
Estonia	-0,18	-0,27	-0,27	-0,11	-0,24	-0,47	-0,40	-0,14
Finland	0,58	0,40	0,49	0,29	0,17	0,31	1,21	0,93
France	-0,19	-0,04	-0,17	0,07	-0,31	0,54	0,14	0,29
Germany	0,08	0,14	-0,14	0,12	0,17	0,28	0,72	1,19
Greece	-0,16	-0,57	0,44	0,38	-0,43	0,28	-0,47	-0,56
Hungary	-0,20	-0,13	-0,31	-0,44	0,05	-0,65	-0,23	-0,68
Iceland	0,21	0,67	0,76	0,24	0,36	0,58	0,88	1,15
Ireland	0,10	0,38	0,15	0,49	0,26	0,22	0,87	0,08
Italy	0,03	-0,10	-0,05	0,02	0,25	0,41	-0,26	0,02
Latvia	-0,30	-0,19	-0,30	-0,44	0,16	-0,30	-1,09	-0,85
Lithuania	-0,14	-0,69	-0,45	-0,48	-0,31	-0,19	-1,09	-0,95
Luxembourg	-0,11	0,41	0,32	0,10	-0,20	0,30	1,03	1,64
Macedonia	-0,38		0,20	0,33	0,10	0,01		-1,67
Malta	-0,23	0,12	-0,09	-0,53	0,60	-0,10		-0,02
Netherlands	0,62	0,16	1,15	0,41	0,22	0,50	1,23	1,33
Poland	-0,27	-0,09	-0,36	-0,44	0,18	-0,46	-0,56	-0,96
Portugal	-0,46	0,05	-0,40	0,06	0,14	-0,25	0,35	-0,32
Romania	-0,46	-0,43	-0,39	-0,24	0,17	-0,53	-1,98	-2,00
Slovakia	-0,34	-0,22	0,29	-0,12	-0,26	-0,01	-1,15	-0,73
Slovenia	-0,21	-0,22	0,08	0,14	0,00	0,11	-0,38	0,01
Spain	0,16	0,03	-0,26	0,11	0,07	-0,15	0,35	-0,07
Sweden	0,76	0,34	1,35	0,55	0,12	1,07	0,94	1,68
United Kingdom	-0,03	0,11	0,10	0,37	0,15	0,42	0,90	0,98

Appendix 4. Initial values of the indicators of economic growth and development

Country	GDP and growth				Investments and export			Human capital					
	GDPpc99	GDPpc07	GDPpcgY 9	GDPin07	CAPFavr	CAPavr	EXPindx	POPgyear	unempl	dropout	primary	secondar	tertiary
Austria	25000	32800	3,9	114,7	21,2	21,7	153,8	0,51	4,31	9,79	102,9	98,8	53,5
Belgium	23300	31100	4,2	114,4	20,2	20,8	123,4	0,49	7,82	12,92	105,1	142,8	56,7
Bulgaria	1500	3800	19,2	146	20,8	24,2	179,4	-0,84	13,24	19,96	106,3	90,9	45,4
Croatia	4100	8400	13,1	139,7	26,3	28,2	152,3	-0,21	12,70	6,15	92,4	84,5	30,5
Czech Republic	5500	12400	15,7	136,1	26,3	27,7	215,3	0,06	7,68	5,90	103,4	82,7	26,4
Denmark	30700	41700	4,5	112,6	20,2	20,9	133,6	0,32	4,67	10,14	101,4	124,6	56,1
Estonia	3900	11600	24,7	177,1	29,7	32,5	173,1	-0,31	9,44	13,54	101,8	92,9	50,4
Finland	23800	33800	5,3	124	19,0	19,8	140,3	0,30	8,78	9,06	99,0	120,8	82,4
France	22700	29800	3,9	113,4	19,7	20,1	119,8	0,67	9,03	13,18	106,8	110,7	52,4
Germany	24500	29500	2,6	108,5	18,9	18,6	162,6	0,03	8,86	13,36	105,7	98,0	
Greece	12100	20500	8,7	134,2	23,6	23,9	118,5	0,36	10,17	16,12	94,3	90,4	46,8
Hungary	4400	10100	16,2	130	22,5	25,8	208,7	-0,22	6,54	12,43	101,7	93,7	33,2
Iceland	29600	46900	7,3	133,7	24,2	24,3	147,6	1,51		28,08	99,1	109,6	40,0
Ireland	24200	42700	9,6	145,4	23,8	24,3	146,2	2,03	4,59	12,67	103,8	107,4	45,9
Italy	19800	25900	3,9	107,9	20,5	20,9	115,5	0,54	8,44	23,44	102,6	91,7	47,1
Latvia	2900	8800	25,4	183,5	27,1	30,4	185,8	-0,60	10,60	16,68	100,1	88,1	50,2
Lithuania	2900	8300	23,3	170,6	22,1	23,8	223,5	-0,53	11,36	11,78	102,3	95,3	43,5
Luxembourg	46000	75200	7,9	133,1	21,2	21,8	151	1,44	3,50	15,76	101,0	97,5	10,8
Macedonia	1700	2700	7,4	117,3	17,1	21,1	:	0,16		46,56	100,9	82,3	21,7
Malta	9400	13200	5,1	112,1	19,9	19,1	114,6	0,98	7,23	14,30	106,8		19,7
Netherlands	24400	34200	5,0	113,2	20,3	20,3	135,9	0,45	3,46	6,23	107,9	123,6	49,5
Poland	4100	8100	12,2	131,7	20,4	21,4	189,9	-0,17	16,43	41,17	98,2	99,5	44,8
Portugal	11200	15300	4,6	107,6	24,0	24,5	133,7	0,54	5,96	21,57	123,4	106,1	45,2
Romania	1500	5600	34,2	151,2	22,3	22,7	210,5	-0,51	7,31	6,17	104,8	79,2	21,8
Slovakia	3600	10200	22,9	152,4	26,5	27,5	224	0,00	16,64	4,94	102,7	85,3	26,2
Slovenia	10300	16600	7,6	134	25,7	27,2	184	0,22	6,32	30,27	99,8	99,7	52,7
Spain	14500	23400	7,7	126,6	27,6	27,9	130,3	1,55	10,30	9,60	105,5	108,3	63,5
Sweden	27200	36300	4,2	121,3	17,3	17,6	144,4	0,41	6,07		109,5	156,6	35,9
United Kingdom	23600	33300	5,1	119,7	17,4	17,8	125,8	0,49	5,18		101,1	101,0	73,0