

Does Social Capital Have an Effect on Industry Production in G7 Countries? Causality Analysis ^{*}

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Abstract. The relationship between social capital and economic growth has become an attractive research area in the literature recently. In this context, this paper examines the relationship between social capital indicators and industry production in the period of 2006-2014 with monthly data for the G7 countries. For empirical analysis, panel causality analysis method developed by Dumitrescu & Hurlin (2012) was used. Results indicate that there is a bidirectional relationship between social capital indicators and industry production. These findings support feedback hypothesis in the context of social capital and economic growth in the G7 countries.

Keywords. Social capital, Industry production, Economic growth, Panel causality, G7 Countries.

JEL. F63, J24, O47.

1. Introduction

Recently, the impact of social capital on economic growth has been an important topic of discussion. The majority of studies analyzing relationship between social capital and economic growth disagree with the opinion that economic growth is determined by traditional factors such as capital, labor force and national resources. This debate ensues from the study titled “Making Democracy Work” conducted by Putnam *et al.* in (1993). It is the first paper focusing on relationship between social capital and economic growth. Putnam *et al.* (1993) compare social capital and economic development by dividing Italy into two regions and point out that the region with higher social capital grows faster economically. Putnam *et al.* (1993) define social capital as social union characteristics such as norms, networks and trust that increase social efficiency by facilitating cooperation activities. James Coleman is another researcher who has contributed to the concept of social capital. Coleman (1988, 1990) defines social capital as institutional relationships between the people and evolution that facilitates certain activities of individuals in social structure and institutional actors.

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Whiteley (2000) describes social capital as people who want to rely on their family members, citizens and other individuals, Woolcock & Narayan (2002) as norms and networks that enable people to act together, Putnam (2001), as evolution that constitutes values for individuals and provides positive externalities, and finally Sciarrone (2002), describes social capital as all of resources resulting from social relationship that occur due to the individual's position in networks.

On the other hand, Fukuyama (1995a, 1999, 2002), describes social capital as individuals' ability to act together in groups for their common purpose, norms provide interindividual cooperation or informal set of values. World Bank (1998) states that social capital includes institutes that rule interactions between the individuals in the society, relationships, behaviors and values. The report also explains that social capital is a contributory factor for economic and social development. OECD (2001) determines social capital as trust, norm and communication network that increase social productivity and facilitate coordination activities between community members, civil society organizations and public institutions. In economic sense, OECD (2001) accepts social capital as a confidential relation between people and institutions which reflects economic efficiency and production.

In terms of social capital; trust and organizational efficiency variables are often used as an indicator in the literature. These indicators are generally obtained from World Values Surveys and utilized for micro social capital indicators (La Porta *et al.* 1997; Knack & Keefer 1997). While micro social capital represents social capital forming in a society, macro social capital represents social capital occurring in public sphere. Democratic accountability, democratic participation, superiority of law, rule of law, applicability of agreements, regimes, government stability, political, economic and financial risk assessments, quality of institutions are considered as macro social capital indicators (Knack & Keefer 1995, 1997; Akçay, 2005). Other indicators in the literature accepted as social capital indicators are safety laws, corruption, transparency, effectiveness of the management system, adequacy and credibility of governments.

The study focuses on institutional indicators compiled by the International Country Risk Guide (ICRG) that provides private international risk service. The study uses ICRG data accepted as social capital indicators by Mauro (1995), Knack & Keefer (1995). These ratios are accepted as government social capital and macro social capital in the literature (Mauro 1995; Knack & Keefer 1995; Kormendi & Meguire 1985).

Fukuyama (1995a) argues that generalized trust factor has a positive impact on economic performance in developed countries. This study aims to contribute to the literature by analyzing this thesis of Fukuyama. From this point of view, the relationship between economic growth and social capital is tested in some developed countries. In this context, the concept of social capital is discussed in introduction. In the first part, theoretical relationship between social capital and economic growth is demonstrated. In the second part, empirical studies analyzing the relationship between social capital and economic growth are categorized into two according to positive and negative results. In the third part, the relation between social capital and economic growth is analyzed for the period of 2006-2014 for G7 countries. In conclusion, empirical findings are evaluated and some policy recommendations are suggested.

2. Theoretical Background

Economists admit that social capital is an important explanatory variable for economic development along with the macroeconomic variables. Fukuyama (1995a) and Putnam *et al.* (1993) stress that social capital has a positive impact on economic growth. Fukuyama (1995a) considers social capital as generalized trust for successful economic performance in developed countries and underlines that social capital is a key factor for economic development. While Putnam *et al.* (1993) refer to norms and networks for social capital, Fukuyama (1995a) has a high

opinion of the role of trust. There are some studies in the literature in the field of social capital. However, it is seen that there are not sufficient empirical studies that analyze the positive impact of social capital on economic performance as both Putnam *et al.* (1993) and Fukuyama (1995a, 1995b) come up with their studies (Paldam & Svendsen, 2000; Beugelsdijk & Schaik 2005). Measuring social capital empirically is complicated and this is the main reason for this issue (Salahuddin *et al.*, 2015).

According to Fukuyama (1995a), generalized trust is required for successful economic performance in developed countries. Trust enables cooperation without direct effect of power and market. Therefore, trust not only serves as an alternative in legal system, but also facilitates complex transactions even in a well-functioning institutional system. In other words, even in the presence of a well-functioning institutional system, some transactions might be almost impossible in the absence of trust. According to this idea, in societies with high trust level, new technologies can be applied more effectively and in this way productivity can be enhanced.

Knack (1999) asserts that social capital affects economic performance through two channels as micro and macroeconomic policies. At micro level, social ties and interindividual trust decrease transaction costs, ensures the applicability of the contracts and facilitates loans for the individual investors. At macro level, social adaptation and civil consensus empower democratic management (Almond & Verba, 1963), social capital can improve the public administration efficiency and qualification (Putnam *et al.*, 1993), and it enhances the quality of economic policies (Easterly & Levine, 1997). Helliwell & Putnam (1995) emphasize the effects of institutional performance on economic growth and suggest alternative components such as civil society and citizen satisfaction to measure this performance. Zak & Knack (2001) propound that in societies with high trust level investment and economic growth can be high and income equality can raise social trust.

3. Empirical Literature

The first empirical study on the relationship between social capital and economic growth was conducted by Kormendi & Meguire in 1985. Kormendi & Meguire (1985) investigated the relationship between government social capital and economic performance with a statistical approach in 47 countries. Civil freedom is an important indicator for social capital in the study and it is found to be a key factor to explain the share of investment in GDP. Besides, high civil freedom increases the share of investment in GDP by %5.

Other empirical studies in the literature in the field of social capital focus on some different indicators to explain social capital such as trust, norms, networks, organizational effectiveness (Putnam *et al.*, 1993), and trust (Knack & Keefer, 1997). Putnam *et al.* (1993) employed group membership in their model as a social capital indicator and found that North Italy has developed faster than South Italy due to its high social capital level. According to Putnam *et al.*, regional differential in terms of economic and institutional performance makes a major contribution to development of social capital. Knack & Keefer (1997) have no proof about group membership to government agency; however, they found a strong relationship among trust, civil norms and income. There is a relationship between economic growth performance and trust as well. Besides, Knack & Keefer (1997) state that countries in which agreements and intellectual property rights are protected by governmental agencies, trust factor and civil norms are more effective. According to Knack (2002) social ties and trust provided in the society are associated with property and agreement rights which are in force in the country. Like property and agreement rights, trust factor decreases uncertainty in the market and transaction costs.

Apart from the studies which have found negative or positive relationship between social capital and economic growth, there are some studies finding no relationship between the variables. Most of those studies conclude that social capital contributes to economic growth and development of the countries (Putnam

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et al., 1993, Knack & Keefer, 1997, Hjerppe, 1998, La Porta *et al.*, 1999, Zak & Knack, 2001, Beugelsdijk & Schaik, 2005). However, some studies purports a negative relationship between social capital and economic growth (Helliwell, 1996, Raiser *et al.*, 2001, Roth, 2006). Literature related to this issue is summarized in two different categories.

Table 1. Studies Based on Positive Relationship Between Economic Growth and Social Capital

Author	Country/ Region	Period	Method	Variables	Conclusion
Knack & Keefer (1997)	29 Market Economies	1981-1991	OLS	Social Capital Economic Growth	There is a strong and significant relationship between social capital and economic growth.
Hjerppe (1998)	Selected 27 Countries	1990-1993	OLS	Trust, Participation in Civil Organizations, GDP	There is a positive relationship between trust level and economic growth.
Temple & Johnson (1998)	74 Developing Countries	1957-1962	Robustness Test	Social Capital Economic Growth	Social capital has a positive impact on economic growth.
La Porta <i>et al.</i> (1999)	39 Countries	1970-1993	OLS	Trust (Institutions) and Economic Growth	Trust accelerates economic growth.
Whiteley (2000)	34 Countries	1970-1992	OLS	Interindividual Trust and Economic Growth	Trust has a strong impact on economic growth.
Zak & Knack (2001)	37 Countries	1970-1992	OLS	Trust Level and Economic Growth	Countries with higher trust have higher economic growth rates.
Karagül & Akçay (2002)	36 Countries	1960-1995/1980-1995	Time Series Analysis	Social Capital Economic Growth	There is a positive relationship between social capital and economic growth.
Beugelsdijk & Schaik (2005)	54 EU Regions	1950-1998	Robustness Test	Social Capital Economic Growth	Regional growth differentials in Europe are related to the social capital level.
Baliamonue (2005)	39 Africa Countries	1975-2000	Unbalanced Panel Data Analysis	Social Capital Economic Development	Social capital has a strong impact on income growth.
Rupasingha <i>et al.</i> (2006)	Some States in the USA	1980-1997	OLS	Social Capital Economic Growth	There is a positive relationship between social capital and economic growth.
Dinçer & Uslaner (2007)	43 bordering province. in the USA	1990-2000	OLS	Trust and Economic Growth	There is a positive relationship between trust level and economic growth.
Dinda (2008)	63 Countries	1990-2000	Time Series Analysis	Social Capital, Human Capital Economic Growth	Social capital has an indirect effect on economic growth through human capital.
Dearmon & Grier (2009)	51 Countries	1981-2004Q4	Unbalanced Panel Data Analysis	Trust and Economic Growth	Trust affects economic growth indirectly.
Feki & Chtouro (2014)	Developed and Developing Countries	1990-2004	Static and Unbalanced Panel Data Analysis	Social Capital Economic Growth	With the high trust level, interindividual communication have a positive impact on economic growth.
Ponzetto & Troiano (2014)	Developing countries	1981-2008	Dynamic Equilibrium	Social Capital, Human Capital Public Investment and Economic Growth	Social capital affect economic growth positively through productive public investment which promotes human capital.
Aguilera (2016)	North and South America Countries	1994-2014	Panel Data Analysis	Social Capital Economic Growth	There is a positive relationship between social capital and economic growth.

Table 2. Studies Based on Negative or No Relationship Between Economic Growth and Social Capital

Author	Country/Region	Period	Methodology	Variables	Conclusion
Helliwell (1996)	Asian Countries	1987-1994	OLS	Social Capital, Institutional Quality and Economic Growth	Social capital and institutional quality have no explanatory capacity on economic growth.
Raiser <i>et al.</i> (2001)	Central and Eastern Transition Countries of the Soviet Union	1990-1995	OLS	Social Capital, Economic Growth	There is no positive relationship between social capital and economic growth.
Iyer <i>et al.</i> (2005)	9 Region in US	2000	Ordered Logit Regression Model	Social Capital, Regional Development and Economic Growth	Although it is not strong, there is a positive relationship between development and social capital.
Sabatini (2006)	Italy	1998-2002	Time Series Analysis	Social Capital, Economic Development	No relationship is found between social capital and economic growth, on the contrary, weak ties between the individual could provide a positive contribution to economic growth.
Neira <i>et al.</i> (2008)	14 Developed OECD Countries	1980-2000	Panel Data Analysis	Social Capital, Human Capital Economic Growth	It is stated that social capital is important for economic growth, however it cannot accelerate economic growth singly.
Neira <i>et al.</i> (2010)	EU-15 Countries and Eastern EU Countries	2002-2008	Cross Section Analysis	Social Capital, Human Capital Economic Growth	No certain relationship is found between social capital and economic growth.
Pfister (2010)	116 Countries	1950-2005	Panel Data Analysis	Social Trust, Economic Growth	It is precipitated that impact of social trust on economic growth fluctuates according to the development level of the country.
Salahuddin <i>et al.</i> (2015)	Australia	1985-2013	Time Series Analysis	Social Capital, Internet Usage Economic Growth	No relationship is found between social capital and economic both short and long term.
Palamino (2016)	237 Regions in Europe	1995-2007	Non-Parametric Regression Model	Social Capital, Economic Growth	It is found that relationship between social capital and economic growth is not linear.

4. Econometric Analysis

4.1. Data

This study analyzes the impact of social capital on economic growth by causality analysis for G7 countries (America, Japan, Canada, Germany, France, Italy, and the United Kingdom) over the period of 2006-2014 with annual data. 7 indicators that represent social capital are utilized in the study. These indicators are democratic accountability (DA), contract viability (CONT), law and order (LO), economic risk assessment (ER), financial risk assessment (FR), political risk assessment (PR) and government stability (GOV) respectively. The data of Industry Production Index (IP) representing economic growth pertain to the International Financial Statistics published by International Monetary Fund. All data used in the analysis are seasonally adjusted.

According to the ICRG Guide to Data Variables (PRS Group, 2016), some explanations related to the data and ICRG methodology are given below:

Democratic Accountability: A measure of, not just whether there are free and fair elections, but how responsive government is to its people. The less responsive it is, the more likely it will fall. Even democratically elected governments can delude themselves into thinking they know what is best for the people, regardless of clear indications to the contrary from the people.

Contract Viability: The risk of unilateral contract modification or cancellation and, at worst, outright expropriation of foreign owned assets.

Law and Order: Two measures comprising one risk component. Each subcomponent equals half of the total. The "law" sub-component assesses the strength and impartiality of the legal system, and the "order" sub-component assesses popular observance of the law.

Economic Risk: A means of assessing a country's current economic strengths and weaknesses. In general, where strengths outweigh weaknesses, a country will show low risk and where weaknesses outweigh strengths, the economic risk will be high. To ensure comparability between countries, risk components are based on accepted ratios between the measured data within the national economic/financial structure, and then the ratios are compared, not the data.

Political Risk: A means of assessing the political stability of a country on a comparable basis with other countries by assessing risk points for each of the component factors of government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality.

Financial Risk: A means of assessing a country's ability to pay its way by financing its official, commercial and trade debt obligations. To ensure comparability between countries, risk components are based on accepted ratios between the measured data within the national economic/financial structure, and then the ratios are compared, not the data.

Government Stability: A measure of the government's ability to stay in office and carry out its declared program(s), depending upon such factors as the type of governance, cohesion of the government and governing parties, approach of an election, and command of the legislature.

Table 3 indicates explanatory statistics and correlation matrix based on the data utilized in the analysis. According to this, all statistics belong to IP variable are greater than the statistics belong to other variables. Correlation matrix shows that there is a positive correlation between Ip variable and social capital indicators. These findings present some preliminary information. However, in the next phase, unit root and causality tests will be utilized to reach more effective information for the relationship between the variables.

Table 3. Explanatory Statistics and Correlation Matrix

Explanatory Statistics	DA	CONT	LO	ER	FR	PR	GOV	IP
Mean	5.766	3.645	4.992	37.914	38.551	80.474	7.540	103.106
Median	6.000	4.000	5.000	38.250	39.000	80.500	7.500	101.630
Min.	6.000	4.000	6.000	47.500	46.500	88.500	11.000	122.370
Max.	4.500	2.000	4.000	29.000	30.000	68.000	3.500	76.590
Std. Error	0.369	0.525	0.490	3.335	3.570	4.585	1.415	7.451
Obs. Number	756	756	756	756	756	756	756	756
Correlation Matrix								
DA	1							
CONT	-0.051	1						
LO	0.325	0.329	1					
ER	-0.025	0.481	0.276	1				
FR	-0.432	0.324	0.326	0.385	1			
PR	0.115	0.695	0.525	0.432	0.366	1		
GOV	0.221	0.366	0.139	0.021	0.037	0.648	1	
IP	0.075	0.424	0.049	0.453	0.030	0.149	0,097	1

4.2. Method

In this study relationship between social capital and economic growth is analyzed with panel causality test developed by Dumitrescu and Hurlin in 2012. For causality test, integration levels of series should be determined first. At the first step of the empirical analysis, stationarity of series will be tested with panel unit root test developed by Levin *et al.* (2012, LLC) and Im *et al.* (2003, IPS). For LLC panel unit root test, the model below should be estimated:

$$\Delta y_{it} = \mu_i + \rho y_{it-1} + \sum_{j=1}^m \alpha_j \Delta y_{it-j} + \delta_{it} + \theta_t + \varepsilon_{it} \quad (1)$$

In Equation (1), Δ represents the first difference operator, m represents lag length, μ_i and θ_t are entity-specific fixed and time effects. $\rho = 0$ null hypothesis is

tested against $\rho < 0$ hypothesis for all i values. Rejection of null hypothesis means series are stationary.

IPS test developed by Im et al. (2003) calculates each section in the panel and average them by modifying LLC test. This test allows a variety of ρ values for each unit to form the panel. If Equation (1) is written again:

$$\Delta y_{it} = \mu_i + \rho y_{it-1} + \sum_{j=1}^m \alpha_j \Delta y_{it-j} + \delta_{it} + \theta_t + \varepsilon_{it} \quad (2)$$

For IPS test, null hypothesis is tested for all i values against $\rho = 0$, at least one i value against $\rho < 0$ alternative hypothesis. Rejection of null hypothesis stands for that series are stationary.

The causality test developed by Dumitrescu & Hurlin (2012) and based on Wald statistics considers heterogeneity and dependence between countries. This case increases the reliability of test results. As for this test, null hypothesis “there is no causality relation for all sections” is examined against alternative hypothesis “there is a causality relation for some sections” by Wald test. Wald statistics is calculated as follows:

$$W_{N,T}^{Hnc} = \frac{1}{N} \sum_{i=1}^N W_{i,T} \quad (3)$$

In Equation (3), N and T represent section and time dimensions, respectively. Dumitrescu & Hurlin (2012) suggest using $Z_{N,T}^{Hnc}$ test statistics when time dimension (T) is greater than section dimension ($T > N$). In this study, $T > N$ and so $Z_{N,T}^{Hnc}$ test statistics are used. After analysis, test statistics related to causality are indicated in Equation (4) by calculating test statistics and probability values belonging to these statistics.

$$Z_{N,T}^{Hnc} = \sqrt{\frac{N}{2K}} (W_{N,T}^{Hnc} - K) \rightarrow N(0,1) \quad (4)$$

4.3. Empirical Findings

Results of panel unit test are shown in Table 4. According to the those results, series employed for the analysis are not stationary at level values. The series are found to be stationary at the first difference, however. Therefore, integration level of series is $I(1)$.

Table 4. Panel Unit Root Test Results

Variables	LLC	IPS
DA	0.046	-0.198
CONT	-0.674	-2.582 ^a
LO	0.164	0.532
ER	-1.397 ^b	-0.898
FR	-3.037 ^a	-0.847
PR	-0.611	-0.746
GOV	-0.369	-0.601
IP	0,640	0.069
Δ DA	-8.375 ^a	-7.445 ^a
Δ CONT	-18.671 ^a	-19.703 ^a
Δ LO	-19.902 ^a	-18.183 ^a
Δ ER	-24.076 ^a	-24.639 ^a
Δ FR	-22.174 ^a	-25.037 ^a
Δ PR	-26.172 ^a	-23.765 ^a
Δ GOV	-19.605 ^a	-22.324 ^a
Δ IP	-31.538 ^a	-26.658 ^a

Note: ^a and ^b illustrates 1%and 5% significance level respectively.

In Table 5, Dumitrescu & Hurlin (2012) panel causality test results are reported. For the test, integration level of series $I(1)$ are used. According to the findings,

there is a direct causality relationship between industrial production and democratic accountability (DA), contract viability (CONT), law and order (LO), financial risk assessment (FR), and government stability (GOV). Thus, there is a feedback relation between industrial production and five indicators representing social capital. In addition, there is a unidirectional causality relation from economic risk and political risk to industrial production. Therefore, both economic and political risks affect industrial production. However, industrial production does not affect economic and political risk. These findings imply that social capital indicators have a significant impact on industrial production.

Table 5. Dumitrescu & Hurlin (2012) Panel Causality Test Results

Causality	Wald ist.	Causality	Wald ist.
DA→IP	3.602 ^a (0.00)	IP→DA	4.971 ^a (0.00)
CONT→IP	4.685 ^a (0.00)	IP→CONT	11.083 ^a (0.00)
LO→IP	1.919 ^a (0.08)	IP→LO	2.174 ^a (0.04)
ER→IP	8.98 ^a (0.00)	IP→ER	1.240 (0.18)
FR→IP	3.777 ^a (0.00)	IP→FR	4.362 ^a (0.00)
PR→IP	2.048 ^b (0.04)	IP→PR	1.535 (0.12)
GOV→IP	3.579 ^a (0.00)	IP→GOV	3.506 ^a (0.00)

Note: ^a, illustrates 1% significance level; ^b, illustrates 5% significance level; ^c, illustrates 10% significance level.

5. Conclusion

In this study, the relationship between social capital indicators and industry production is examined in the period of 2006-2014 with monthly data for the G7 countries (America, Japan, Canada, Germany, France, Italy, United Kingdom). Democratic accountability (DA), contract viability (CONT), law and order (LO), economic risk assessment (ER), financial risk assessment (FR), political risk assessment (PR) and government stability (GOV) represent social capital, and industrial production (IP) represents economic growth in the study. The causality between social capital indicators and industrial production was estimated via Dumitrescu and Hurlin (2012) panel causality test method. According to the findings, there is a direct causality relationship between industrial production and democratic accountability (DA), contract viability (CONT), law and order (LO), financial risk assessment (FR), and government stability (GOV). Hence, there is a feedback relation between industrial production and five indicators stand for social capital. Furthermore, there is a unidirectional causality relation from economic risk and political risk to industrial production. Therefore, both economic and political risks have impacts on industrial production. However, industrial production has no impact on economic and political risk. These findings suggest that social capital indicators have a significant impact on industrial production.

Empirical results indicate that governments should focus on factors such as social capital indicators in addition to labor force, capital, natural resources and technology for economic growth policies. Since social capital represents trust factor, it might be considered that rise in social capital decreases uncertainty in the market. In addition, developing relationships between individuals and institutions based on trust factor has a significant impact on economic performance. Development of trust, communication and harmony between individuals and institutions may contribute to economic productivity through political, social and economic policies.

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