Cognitive Abilities, Democracy and Intellectual Property Rights Protection

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Abstract

The goal of this research is to investigate the link between cognitive abilities, as measured by cognitive abilities index and intellectual property rights protection using cross-national data. The findings suggest that cognitive abilities at a national level are significantly related with IPR protection. As expected intellectual capacity is positively and significantly related to the intellectual property rights and explain nearly 23% of cross national differences. In particular, a one standard deviation increase in the cognitive abilities index is associated with slightly less than a half standard deviation rise in IPR index. However, 65% of the effect of cognitive abilities on IPR protection is mediated by the democratic institutions.

Keywords: cognitive capital, intellectual, property protection

1. Introduction

A ballooning body of cross country studies investigates the impact of cognitive abilities on economic growth and GDP per capita, as well as a number of other socio-economic factors (Salahodjaev, 2015a; Salahodjaev, 2015b; Whetzel & McDaniel, 2006; Ram, 2007). Moreover, a number of follow up papers find that cognitive abilities are instrumental to antecedents of economic growth such as institutions (Kanyama, 2014) and credit sector size (Kodila-Tedika & Asongu, 2015) and corruption (Potrafke, 2012).

Although, related studies find that cognitive abilities is an antecedent of quality of institutional arrangements, the link between cognitive abilities and protection of intellectual property has not been explored up to this date.

Taking into account that intellectual property rights (IPR) are beneficial for economic growth (Thompson & Rushing, 1996; Adams, 2009), cognitive abilities may also be indirectly related on economic growth via this channel. Thus, the goal of this research is to explore this relationship. There are several channels: successfulness of economic policies, rule of law and soundness of institutions and human abilities.

Earlier studies show that human abilities, as estimated by a cognitive abilities index, is a robust antecedent of GDP per capita and economic growth. For instance, Weede and Kampf (2002) argue that 'standard indicators of human capital endowment — like literacy, school enrollment ratios or years of schooling — suffer from a number of defects. They are crude. Mostly, they refer to input rather than output measures of human capital formation. Occasionally, they produce implausible effects. They are not robustly significant determinants of growth. Here, they are replaced by average intelligence. This variable consistently outperforms the other human capital indicators in spite of suffering from severe defects of its own. The immediate impact of institutional improvements, i.e., more government tolerance of private enterprise or economic freedom, on growth it is in the same order of magnitude as intelligence effects are' (p. 380). Johnes and Schneider (2004) using cross- national data for the cognitive abilities index explore the effect of intellectual capital on economic growth. The study adopts a cross national growth regression model and finds that in growth regressions that include only robust control variables, IQ is statistically significant in 99.7% of these 1330 regressions. Similarly, Hunt and Whittman (2008) further find that intelligence is significantly related to economic development, although they 'question the simple explanation that national intelligence causes national wealth' (p.1).

In addition, cognitive abilities may also be related to the intellectual property right via quality of legal arrangements. For example, Potrafke (2012) shows that in countries with higher average intellectual abilities

there is a lower level of corruption. In a follow up study, Salahodjaev (2015c) analyzing data from more than 150 nations finds that cognitive skills have a negative effect on the size of the informal sector relative to GDP. Furthermore, studies find a positive correlations between intelligence and governance indicators (Kanyama, 2014) and freedom (Meisenberg, 2012; Meisenberg, 2014).

Thus study further adds to the related cross-national studies on the effect of cognitive abilities on various socio-economic outcomes by exploring the link between cognitive abilities index and strength of intellectual property rights in a sample of more than 120 nations.

The results of this study show that nations with higher levels of cognitive abilities are more likely to have stronger IPR protection. This link remains significant and robust even when we take into account the level of economic development, culture or types of adopted legal systems.

2. Data & Methods

This research adopts a proxy for IPR protection, namely the IPR index from Property Rights Alliance to explore the effect of cognitive capital on IPR protection.

Intellectual Property Rights (IPR) index

The International Property Rights Index (IPRI) was formulated by the Property Rights Alliance to operate as a benchmark for the conditions of property rights across the world. The IPRA takes into account three core aspects: the legal and political environment (LP), physical property rights (PPR) and intellectual property rights (IPR),

The Legal and Political Environment (LP) component provides an insight into the strength of the institutions of a country, the respect for the 'rules of the game' among citizens; consequently, the measures used for the LP are broad in scope. This component has a significant impact on the development and protection of physical and intellectual property rights.

The other two components of the index—Physical and Intellectual Property Rights (PPR and IPR)—reflect two forms of property rights, both of which are crucial to the economic development of a country. The items included in these two categories account for both de jure rights and de facto outcomes of the countries considered[1].

The overall grading scale of the IPRI ranges from 0 to 10, where 10 is the highest value for a property rights system and 0 is the lowest value (i.e. most negative) for a property rights system within a country.

Cognitive abilities

As a measure for cognitive abilities we use cognitive abilities index at a national level from Rindermann (2007). In this study the author derives a cognitive abilities index for more than 180 nations based on international student assessment tests such as TIMMS[2], PISA[3], PIRLS[4]. In addition, the study relies on international intelligence test studies collected by Lynn and Vanhanen (2012) and discussed in Volken (2003) and Barnet and Wiliams (2004). This index ranges from 59 to 105 with an average of 84.

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[1]See http://internationalpropertyrightsindex.org/ipri2016_comp for more details

[2]Trends in International Mathematics and Science Study

[3]Programme for International Student Assessment

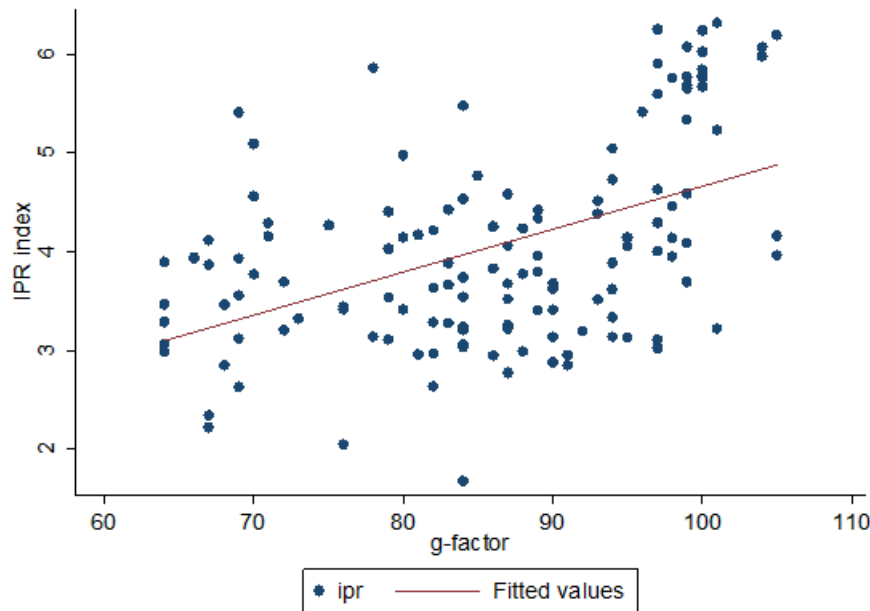[4]Progress in International Reading Literacy Study

Figure 1. Visual association between cognitive abilities and IPR index, n – 138, corr. coef. = 0.49

Fig. 1 present visual association between cognitive abilities and IPR index for a sample of 138 nations. The results suggest that cognitive abilities are positively linked to intellectual property protection. For example the correlation is 0.49 and it is significant at the 1% level. However, while scatterplot presented above indicates that cognitive abilities and intellectual property rights have a positive relationship, this link may be driven by omitted variables or moderated by other variables. Thus, to assess the relationship between cognitive abilities and IPR index we adopt a regression function that can be specified as:

$$IPRI = INTERCEPT + b*CA + c*CONTROLS + error \qquad (1)$$

where IPRI is intellectual property rights protection index; CA is variable that measures cognitive abilities index by country; CONTROLS is a set of control variables, namely, GDP per person, ethnic fractionalization, binary variable for nations with British legal origins and democracy index. Table 1 presents descriptive statistics. The descriptive statistics suggest that in our sample GDP per capita ranges from 640 international dollars in purchasing power parity to 132,0000 PPP $. Nearly 33% of the countries in our sample have adopted British legal system and majority of countries have passed democratic transition threshold of 3.5 points.

Table 1. Descriptive statistics

Variable	Description	Mean	Std. Dev.	Min	Max
IPR	IPR index	4.057247	1.030612	1.67984	6.312332
GDP per capita	GDP per person (in '000s PPP USD)	17.77692	20.60943	0.640589	132.9723
Cognitive abilites	Cognitive abilities index	84.11579	11.65225	59	105
Ethnic fractionalization	The index of ethnic fractionalization	0.438444	0.258361	0	0.9302
British legal origins	Dummy variable for countries with UK legal origin	0.338309	0.474315	0	1
Democracy	Democracy index	4.664063	1.980378	1	7

3. Results

The econometric results are displayed in Table 2. Table 2 presents OLS results estimated in Stata 12 statistical software using standard OLS regression estimator with heteroskedasticity adjusted standard errors. Column 1 is a one variable specification where the IPR index is regressed on the cognitive capital index only. As expected cognitive capital is positively and significantly related to the intellectual property rights and explains nearly 23% of cross-national differences. In particular, a one standard deviation increases in cognitive abilities index which is associated with slightly less than a half standard deviation rise in IPR index.

However, extant studies also show that cognitive abilities is an important ingredient of economic development. Therefore it is important to control for the GDP per person in this specification. Column 2 takes into account this

factor and shows that GDP per person is positively and significantly linked to IPR. More importantly, the cognitive abilities index retains is significant effect, although at a 5% level. The results also suggest that when GDP per capita increases by 10,000 international dollars – IPR index increases by 0.3 slightly less than a half standard deviation.

In column 3, we further include a dichotomous variable for nations with British legal origins from La Porta et al. (2008) and the ethnic fractionalization index from Alesina et al. (2003). The results suggest that countries with British legal origins have higher levels of IPR protection while the effect of culture, measured by ethnic diversity is insignificant. The effect of cognitive abilities remains robust. This column further highlights the importance of legal system in effective management of intellectual property.

Finally, in column 4 we include a democracy index from Freedom house indicators. The results show that the democracy index has positive and significant effect on IPR index. This variable is significant at the 1% level suggesting that protection of intellectual property is better in democratic countries. However, we also find that cognitive abilities are insignificantly related to the IPR index now. This implies that the direct effect of cognitive abilities is mediated by the political and civil liberties. This specification explains nearly 60% of cross-national variations in IPR protections. Moreover, the variance inflation factor for this model is below 10, suggesting that multicollinarity is not a problem in our empirical exercise.

Table 2. Cognitive abilities and IPR protection

	(1)	(2)	(3)	(4)
Cognitive abilities	0.0434***	0.0147**	0.0168**	0.0065
	(0.0068)	(0.0063)	(0.0070)	(0.0071)
GDP per person		0.0317***	0.0300***	0.0295***
		(0.0036)	(0.0034)	(0.0033)
British legal law			0.5323***	0.4690***
			(0.1335)	(0.1296)
Ethnic fractionalization			-0.3439	-0.2213
			(0.2786)	(0.2673)
Democracy				0.1431***
				(0.0359)
Intercept	0.3236	2.1968***	2.0370***	2.2035***
	(0.5900)	(0.5112)	(0.6476)	(0.6177)
N	138	136	136	135
adj. R^2	0.2252	0.5145	0.5625	0.5975

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

To test this mediation effect we apply Sobel-Goodman mediation test. The results of this test suggest that 65% of the effect of cognitive abilities on IPR protection is mediated by the democratic institutions. This implies that the indirect effect of cognitive abilities on IPR is stronger than direct effects.

Finally, we tested whether this mediation effect is driven by countries with lowest and highest levels of democracy in our sample. To do so we have removed countries with the highest level of democracy (7 points) in column 1 and the lowest levels of democracy (1 and 2 points) in column 2. The estimates show that cognitive abilities index is insignificant while the democracy index is significant in this model. Thus may suggest that democratic countries are the winners of stronger protection of intellectual property.

Table 3. Cognitive abilities and IPR protection: sub-samples

	(1)	(2)
Cognitive abilities	0.0013	0.0078
	(0.0074)	(0.0074)
GDP per person	0.0234***	0.0295***
	(0.0037)	(0.0033)
British legal law	0.4590***	0.4887***
	(0.1450)	(0.1337)
Ethnic fractionalization	-0.1316	-0.0794
	(0.2966)	(0.2750)
Democracy	0.0638	0.2400***
	(0.0424)	(0.0431)
Intercept	2.9389***	1.4516**
	(0.6640)	(0.6418)
N	103	119
adj. R^2	0.3551	0.6658

Standard errors in parentheses * p<0.1, ** p<0.05, *** p<0.01

4. Conclusion

The findings of this article are important for a set of reasons. First, our results further show that human capital as captured by the cognitive abilities index, is an important variable in the prediction of a sub-dimension of a quality of legal systems such as IPR protection. Extant studies seemed to neglect the importance of cognitive abilities in this field of research.

Second, the results of our empirical exercise may indicate that cognitive abilities have indirect and positive effect on economic growth via the stronger protection of intellectual property. Therefore, the results reported in this study further highlight the significance of the abilities in economic growth and quality of efficiently functioning legal system. Thus, in cognitively able societies institutions protect business environment, achievements and thus improve welfare.

Finally, the findings of the Sobel-Goodman test imply that democratic countries are the beneficiaries of higher levels of cognitive abilities and IPR association.

On the other hand, there are some limitations in our research. First, this study is devoted to investigate the link between human abilities and IPR protection on the legal level, while whether cognitive capital reduce the size of illegal market for intellectual property remains the avenue for future research.

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