NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

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INSTITUTIONS AND THE ALLOCATION OF TALENT

BASIC RESEARCH PROGRAM

WORKING PAPERS

SERIES: ECONOMICS
WP BRP 15/EC/2012

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INSTITUTIONS AND THE ALLOCATION OF TALENT[3]

Institutions affect investment decisions, including investments in human capital. Hence institutions are relevant for the allocation of talent. Good market-supporting institutions attract talent to productive value-creating activities, whereas poor ones raise the appeal of rent-seeking. We propose a theoretical model that predicts that more talented individuals are particularly sensitive in their career choices to the quality of institutions, and test these predictions on a sample of around 95 countries of the world. We find a strong positive association between the quality of institutions and graduation of college and university students in science, and an even stronger negative correlation with graduation in law. Our findings are robust to various specifications of empirical models, including smaller samples of former colonies and transition countries. The quality of human capital makes the distinction between educational choices under strong and weak institutions particularly sharp. We show that the allocation of talent is an important link between institutions and growth.

JEL classification: D02, I25, J24, O43

Key words: institutions, allocation of talent, rent-seeking, economic growth

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[3] We thank Michael Alexeev, Gregory Androushchak, Georgy Sunyaev and participants of the Center for Institutional Studies seminar for valuable comments and suggestions.

Introduction

Institutions set the "rules of the game" in an economy, structure incentives, and thereby affect resource allocation and economic growth. The impact of institutions on growth depends on whether they reward productive activities that create wealth, or unproductive ones, also known as rent-seeking, which redistribute wealth away from its creators.[4] Rent-seeking is harmful for growth since it consumes resources that could have been otherwise invested for productive purposes and suppresses the incentives to engage in productive activities by reducing effective returns to such efforts. Accordingly, institutions fall into two broad categories: those protecting property rights and those facilitating rent-seeking (Acemoglu, Johnson, and Robinson 2001). Large literature provides compelling theoretical and empirical evidence of a strong association between the quality of institutions (including the security of property rights) and economic growth and welfare.

Allocation of human resources – time, labor, and effort – is also highly sensitive to the quality of institutions (Murphy, Shleifer, and Vishny 1991; Acemoglu 1995). Of particular significance is the allocation of entrepreneurship and talent, as these are key drivers of economic growth. Murphy, Shleifer, and Vishny (1991) argue that growth rates are higher in economies where the most talented individuals are engaged in productive activities, as opposed to rent-seeking. Baumol (1990) emphasizes the allocation of entrepreneurial energy: good institutions offer generous rewards to productive Schumpeterian entrepreneurs and thereby generate innovations, whereas poor institutions drag daring and creative individuals into rent-seeking, and hence stifle productivity growth (Mehlum, Moene, and Torvik, 2003).

Apart from allocating the existing stock of human resources, institutions also affect the accumulation of human capital (Pecorino, 1992): chosen education and accumulation of skills reflect anticipated rewards and career prospects, which in their turn are shaped by the prevailing institutions.[5] This is part of a more general investment-based mechanism linking institutions to economic outcomes. In the case of conventional physical and financial investments, good institutions serve as a credible commitment to honour the rights of investors, and the response of investors drives economic growth (Keefer and Knack 1995). Institutions similarly influence investments in human capital. Thus Hall and Jones (1999) observe a positive association between institutional quality and human capital per capita measured by educational attainment. What matters

[4] The separation between rent-seeking and productive activities is not always watertight (Bhagwati 1982; Polishchuk 1994; Acemoglu and Verdier 1998), but we generally assume away such possible overlaps for the purposes of this paper.

[5] Institutions also affect investments in social networks and the adoption of norms, values, identity, and other elements of culture that are essential for economic performance (Akerlof and Kranton 2000; Tabellini 2008; Benabou and Tirole 2011).

this time is not the security of such human capital investments, which are not under a direct threat of expropriation, but rather the prospects of earning returns to particular skills and competences.

It could be expected that good institutions strengthen the appeal of professions and careers that are intensive in productive activities and, on the contrary, that bad institutions raise interest in occupations associated with rent-seeking. In particular, the quality of institutions should affect the choice of subject areas of post-secondary education, when young people are seeking fields where their talents could earn the highest rate of returns. While such conjecture can be deduced from the literature, to the best of our knowledge it has not been yet clearly spelled nor rigorously tested using cross-country data. This paper intends to fill such a gap.

In doing so, we follow Murphy, Shliefer, and Vishny (1991) in using UNESCO data on graduation rates from post-secondary institutions across subject areas and countries around the world. However, unlike the quoted source, our main task is not to use such data to explain cross-country variations in economic performance, but rather to relate the observed variations in relative popularity of different disciplines to the quality of national institutions, measured by institutional performance indexes. Our empirical analysis shows that such a robust relationship exists. Having established this fact, we return to economic performance to show that, indeed, the impact of institutions on growth is mediated by, inter alia, the allocation of talent.

While the link between institutions and economic performance is firmly established and rarely challenged, the direction of causality remains a subject of debate. Our findings lend support to the institutional hypothesis that maintains that causality runs from institutions to growth (Rodrik, Subramanian, and Trebbi 2004), since it is the institutions that motivate career choices of young talent, and such choices in turn affect growth rates, in agreement with earlier literature.[6]

Our empirical strategy is based on an equilibrium model which generates testable hypotheses. In the model, an individual can choose between productive activities and rent-seeking. The individual characteristics affecting the choice are talent, which is a payoff multiplier (irrespective of the chosen activity), and an idiosyncratic preference for rent-seeking over productive activities, which could be positive or negative and is unrelated to talent. In other words, selection between productive activities and rent-seeking is determined by a combination of tastes and material

[6] Allocation of talent could be a part of the "resource curse" mechanism, whereby an abundance of natural resources could have adverse implications for economic growth. Excessive reliance on natural resources is shown to suppress investments in human capital (Gylfason 2001). While this effect is usually ascribed to a relative decline of the manufacturing sector due to the "Dutch disease", another explanation invokes institutional distortions caused by the resource manna (Brunnschweiler 2008), which affects the allocation of talent.

rewards.[7] The model shows that improved protection of property rights causes more individuals to choose productive activities over rent-seeking. Such a response, however, is uneven across a range of abilities: in their career choices, less-talented individuals are not as sensitive to changes in institutional environment than those with higher general abilities. Therefore the impact of institutions on the allocation of talent is more pronounced in the group with abilities in the intermediate range and up. Those pursuing post-secondary education by and large fall in this category, which justifies our focus in the empirical part of the paper on graduates of colleges and universities. Furthermore the model predicts that when institutions are poor, the relative appeal of rent-seeking over productive activities rises with abilities, whereas for good institutions the opposite is true.

Graduation in engineering and sciences are treated in this paper as proxies for the selection of productive activities. Theoretical and empirical evidence indicates that better institutions create a strong demand for such knowledge and skills. Thus, Levchenko (2007) observes that good institutions support more complex production processes that require a greater intensity of skills; similarly Nunn (2007) shows that good institutions favour contract-intensive industries, nearly all of which are in hi-tech and (broadly defined) science and engineering areas.

Pursuing a degree in law is viewed in this paper, as it is by Murphy, Shleifer, and Vishny (1991), as a possible pass into rent-seeking. This is obviously a very crude approximation of the actual boundary between productive activities and rent-seeking – after all, law is a pillar of market-supporting institutions and, as such, is vital for the protection of property rights, which sustains productive activities. However, a markedly lopsided talent allocation across subject areas with a higher preference for law that cannot be explained by other factors could be a reflection of institutional abnormality and our econometric models show that this is indeed the case. In other words, using cross-country *variations* of the share of law students could, with appropriate controls, be a way to capture the appeal of rent-seeking to those choosing their careers. We perform various checks for robustness and show that the established link is stable and highly significant over various specifications of the model.

Cross-country analyses could be susceptible to omitted-variable bias. To rule this out by robustness checks, we reduce our full sample of 95 countries to smaller groups more likely to meet the "ceteris paribus" requirement. We consider two such groups which have been shaped by major "natural experiments". One is former colonies, which, since Acemoglu, Johnson, and Robinson

[7] This assumption is similar to voting-behaviour models where an individual chooses between the platforms of political parties based on economic considerations and ideological preferences (Persson and Tabellini 2000).

(2001), have become a popular testing ground for various institutional conjectures. Another group comprises countries of Central and Eastern Europe and the former Soviet Union. Under command economies, institutions and educational systems in these countries exhibited significant uniformity. In the course of a post-communist transition, a profound institutional divergence has occurred in the group and we show that talent allocation patterns closely match institutional trends. As a result, the link between institutions and allocation of talent within the group of transition countries is particularly pronounced.

The rest of this paper proceeds as follows. In Section 2 we present our theoretical model and in Section 3 describe the data. Our empirical evidence, including baseline estimations of econometric models relating allocation of talent to the quality of institutions and various robustness checks, are presented in Section 4. In section 5 we discuss the link between institutions and allocation of talent for the above mentioned "natural experiment" groups of countries. In section 6 we investigate how the allocation of talent, conditional on the quality of institutions, depends on the talent level. Section 7 presents evidence that allocation of talent is an essential link between institutions and growth. Section 8 concludes.

The Model

Consider an economy with a unit continuum of individuals. Each individual inelastically supplies a unit of effort towards either productive activities or rent-seeking.[8] Individuals are characterized by talent $\theta \geq 0$ and (relative) preference for rent-seeking over productive activities w. The above parameters are distributed independently from each other; talent's cumulative distribution function is $G(\theta)$, with probability density function $g(\theta)$, whereas the preference for rent-seeking is distributed according to $H(w)$ and $h(w)$, respectively. For simplicity, talent measurement is normalized as follows: $\int_0^\infty \theta g(\theta) d\theta = 1$.

If an individual contributes her unit of labor towards a particular activity, her effective labor (Solow 1956) supplied towards this activity is θ (abilities are untied to particular activities); the total stock of effective labor to be divided between production and rent-seeking thus equals 1. The total Θ of all labor supplied towards production purposes produces gross output $Y = \mathcal{F}(\Theta)$, where $\mathcal{F}$ is a neoclassical production function. The quality of property rights protection is measured by the

[8] The assumption that efforts are supplied inelastically is made for simplicity's sake. A more general model with elastic effort supply derived from utility maximization leads to nearly identical conclusions.

share σ of the output that is paid to the owners of production inputs; in particular, assuming a competitive labor market, the rate of return to a unit of effective labor in production is $\sigma\mathcal{F}'(\Theta)$. The balance of the output $(1-\sigma)\mathcal{F}(\Theta)$ is divided, as in Tullock (1980), among rent-seekers in proportion to their effective labor supplied towards rent-seeing; hence the return to a unit of effective labor in rent-seeking is $(1-\sigma)\mathcal{F}(\Theta)/(1-\Theta)$.

An individual with characteristics (w,θ) chooses production as an area of activity whenever

$$\theta\sigma\mathcal{F}'(\Theta) > \frac{\theta(1-\sigma)\mathcal{F}(\Theta)}{1-\Theta} + w,$$

or, denoting

$$A \equiv \sigma\mathcal{F}'(\Theta) - (1-\sigma)\mathcal{F}(\Theta)/(1-\Theta) \qquad (1)$$

the difference of returns to a unit of effective labor in resp. production and rent seeking, whenever $A\theta \geq w$. Hence the share of those in the cohort with talent θ who are engaged in production is $H(A\theta)$, and therefore

$$\Theta = \int_0^\infty H(A\theta)\theta g(\theta)d\theta. \qquad (2)$$

In equilibrium, Θ and A are jointly determined from equations (1) and (2). Once A is known, the number (share) Π of agents participating in productive activities obtains as

$$\Pi = \int_0^\infty H(A\theta)g(\theta)d\theta. \qquad (3)$$

Proposition. For any level $\sigma \in (0,1)$ of institutional quality there exists a unique equilibrium $\Theta = \Theta(\sigma),\ A = A(\sigma)$, where functions $\Theta(\sigma)$ and $A(\sigma)$ are monotonically increasing in σ. The share of agents participating in productive activities $\Pi = \Pi(\sigma)$ is also an increasing function of σ.

The proof follows immediately from the fact that equation (1) defines A as a *de*creasing function of Θ, and, according to equation (2), Θ is an *in*creasing function of A. Furthermore, for curve (1) in the (A,Θ) axes one has $\lim_{\Theta\to 0} A = \infty$ and $\lim_{\Theta\to 1} A = -\infty$, and for curve (2)

$\lim_{A\to\infty}\Theta = 1$and $\lim_{A\to-\infty}\Theta = 0$. Therefore, both curves have a single intersection. To obtain the comparative statics results, notice that an increase in σ pushes the first curve up, while not affecting the second, and therefore shifting the intersection point upwards and to the right along the second curve. Since A is an increasing function of σ, so, according to (3), is Π.

The proposition shows that, indeed, an improvement of protection of property rights increases the ranks of those who are engaged in productive activities and reduces the number of rent-seekers. While this effect is plausible, it is not obvious a priori since an increase of those engaged in production triggers a counter-effect by increasing the gross output and hence its share available for rent-seeking, which could make the appeal of rent-seeking stronger, all else the same (Murphy, Shleifer, and Vishny 1991; Polishchuk and Savvateev 2004). However, the direct effect prevails, prompting the expected reaction of the equilibrium level of production efforts to improved property rights.

On the (w, θ) plane that represents the continuum of agents, the ray $w = A\theta, \theta \geq 0$ separates those engaged in production from rent-seekers, located respectively to the left and right of the separation line. As the quality of institutions rises, this line rotates around the origin clock-wise, and becomes vertical in the intermediate position when $A = 0$, and thus production and rent-seeking offer the same returns per unit of effective labor. This simple observation leads to two interesting corollaries. First, when institutions are strong, i.e., when production earns higher returns than rent-seeking and therefore $A > 0$, the share of those engaged in productive activities in the cohort with talent θ increases as θ rises, and hence only a small percentage among exceptionally gifted individuals are still engaged in rent-seeking, despite massive material losses that such a choice entails. This is evidence of increasing returns to scale in the allocation of talent,[9] which progressively drives rent-seeking out of cohorts with greater abilities. Vice versa, when institutions are weak ($A < 0$), due to the same increasing returns to scale, rent-seeking increasingly crowds out productive activities from more talented cohorts and only those few who have strong innate aversion to rent-seeking can resist the temptation of growing material rewards associated with unproductive activities.

Second, individuals with a low level of talent are less sensitive to the quality of institutions than those with a greater level of talent. At the limit where $\theta \to 0$, institutions become irrelevant and the choice between production and rent-seeking is determined solely by non-material preferences. This means that, if individuals with abilities below a modest cutoff level $\theta_0 > 0$ are excluded from

[9] For other versions and interpretations of this phenomenon, see Murphy, Shleifer, and Vishny (1991).

consideration, the response to institutional change of those with $\theta \geq \theta_0$ is more elastic than such a response for the full continuum of agents. More precisely, let

$$\Pi(\sigma, \theta_0) = \frac{\int_{\theta_0}^{\infty} H(A(\sigma)\theta) g(\theta) d\theta}{1 - G(\theta_0)} \tag{4}$$

be the share of those engaged in productive activities of all agents with $\theta \geq \theta_0$ when the quality of institutions equals σ; notice that $\Pi(\sigma, 0) = \Pi(\sigma)$. One can easily check that for a sufficiently small $\theta_0 > 0$

$$\Pi_\sigma(\sigma, \theta_0) > \Pi'(\sigma). \tag{5}$$

Notice that not only the least, but also the most talented cohorts exhibit low sensitivity in their occupational choices to changes in the quality of institutions, assuming that the institutions before and after the change remain weak or strong. Indeed, due to the economy of scale, nearly all agents among those with exceptionally high talents are engaged in productive activities (when institutions are strong) or rent-seeking (if institutions are weak). However, when the institutions turn from weak to strong, the elasticity of response of highly talented agents rises sharply, and, at the limit, such response can be described by a step function that is equal zero for weak institutions and one for strong ones.

The above model allows for various extensions. We will mention here one of them where institutions affect not only payoffs in production and rent-seeking, but also cultural attitudes to such activities, as in Baumol (1990). In this case, stronger institutions increase aversion to rent-seeking in society; this can be reflected in the model by allowing the distribution of w to depend on σ as a parameter, with a cumulative distribution function $H(w; \sigma)$ that is monotonically increasing in σ. In other words, the distribution of w for lower σ stochastically dominates such distribution for higher ones. In such a case, the impact of the quality of institutions on the allocation of talent becomes even sharper, as it is driven by two effects working in the same direction: the first affecting relative payoffs to production and rent-seeking, and the second affecting social attitudes to these activities.

Data

Our theory implies that in countries with a firmly established rule of law and adequate protection of property rights, we should observe stronger interest in education that prepares students for productive activities, whereas poor institutions raise the attractiveness among younger people of subject areas that could equip for rent-seeking. Furthermore, such institution-related discrepancy should be more pronounced for an upper tail of the talent distribution. This justifies our empirical strategy to measure the allocation of talent in response to the quality of institutions by the enrollment (more precisely, graduation) of college and university students in different fields of study. As in Murphy, Shleifer, and Vishny (1991), we use the share of law school graduates as a proxy for the allocation of talent to unproductive activities (with the caveats made in the first section). The share of those majoring in sciences (broadly defined to include life and physical sciences, mathematics, and computing) is our measure of talent allocation towards productive activities.

Our source of data on student enrollment is the UNESCO Institute of Statistics,[10] which stores information on the number of graduates in tertiary education for 23 educational programs in 102 countries over the period from 1999 to 2009. Unfortunately, the database has quite a few gaps: for example, data on law school graduates are available for 26 countries in 2009 and 47 countries in 2008, but for only 9 countries in 2007. In order to maximize the number of observations, we treat available data as a cross section and take the latest available graduation data for a given field in a country. We believe that this should not significantly bias our results for two reasons. First, the cross-discipline structure of post-secondary education could be "sticky" due to supply-side constraints and multi-year lengths of academic programs. Second, most of the data are available for more recent years close to 2009: for instance, 80% of our data on law and science graduates are from the 2005-2009 period, so that the coverage of this period is fairly accurate and complete.

To measure the quality of institutions, we use the well-known World Bank's Governance Matters database (Kaufmann, Kraay, and Mastruzzi 2010) and take the following measures of institutional quality: rule of law (including the quality of contract enforcement, property rights, and courts); government effectiveness (quality of public service, policies, and independence from political pressure); and control of corruption and state capture. In addition, given the centrality of property rights protection for our analysis, we add the Heritage Foundation's property rights index

[10]www.uis.unesco.org; we are grateful to UNESCO's Chiao-Ling Chien and Albert Motivans who kindly provided detailed data not available from UNESCO's open-access sources.

to the list (Miller and Holmes 2010). We average these indexes for the 2000-2005 period and use the results as explanatory variables. Such choice of timing is essential for two reasons. First, it provides some assurance that the causality we seek to establish indeed runs from institutions to the allocation of talent (measured primarily for the 2005-2009 period), and, second, it reflects the fact that the choice of subject area is made several years prior to graduation.

We also add various control variables from the World Development Indicators database (WDI). Altogether, our sample includes 95 observations of countries for which all of the above dependent, independent, and control variables are available.

Table 1 contains descriptive statistics for the main variables. The table shows such statistics for all countries in the sample and also for sub-samples with stronger and weaker institutions above and below the median Rule of Law Index. In each case, we report means and standard deviations (in parenthesis), and the total number of countries for which data are available.

Simple comparisons of enrollment levels for sub-samples reveal stark differences between countries with strong and weak institutions. Thus, the average share of law school graduates in the countries with a weaker rule of law is almost twice as high as in countries where the rule of law is stronger. Conversely, the average share of science graduates for countries with above the median Rule of Law Index is more than 40% higher than the share for countries below the median. These differences are statistically significant at the 1% level.

Table 1. Descriptive statistics

	All countries	Strong-institution countries	Weak-institution countries
	(1)	(2)	(3)
Share of Law graduates, %	6.22	4.21	8.2 7
	(4.90)	(2.90)	(5.66)
Share of Science graduates, %	8.30	9.72	6.84
	(4.63)	(4.92)	(3.85)
Share of Medicine graduates, %	8.91	9.76	8.00
	(4.58)	(4.68)	(4.36)
Difference between shares of law and science graduates, %	-2.08	-5.52	1.43
	(7.15)	(5.90)	(6.64)
Rule of Law, average country index for 2000-2005	0.13	1.00	-0.74
	(1.01)	(0.63)	(0.36)
Government Effectiveness, average index for 2000-2005	0.25	1.09	-0.59
	(1.02)	(0.71)	(0.39)
Control of Corruption, average index for 2000-2005	0.19	1.03	-0.68
	(1.05)	(0.79)	(0.37)

Private Property Protection, average index for 2000-2005	3.5	4.25	2.7
	(1.13)	(0.81)	(0.82)
GDP per capita, PPP, in 2005 dollars	15064	24 597	5 329
	(13 873)	(13 378)	(4 337)
Average GDP growth rate per capita, 2000-2009, %	2.62	2.04	3.20
	(2.49)	(1.49)	(3.11)
Tertiary education, gross enrollment ratio, %	40.8	55.3	26.0
	(27.9)	(23.3)	(24.2)
Services, value added, % GDP	59.0	66.4	51.6
	(14.0)	(11.3)	(12.5)
Oil reserves,	10 346	9 983	10 716
	(38 457)	(45 281)	(30 445)
Ethnolinguistic fractionalization index (ELF)	0.39	0.30	0.47
	(0.25)	(0.21)	(0.25)
Log Population	16.2	15.9	16.5
	(1.5)	(1.5)	(1.4)
English legal origin	0.24	0.31	0.17
French legal origin	0.44	0.31	0.57
Observations	95	48	47

Notes: Mean values of main variables with standard deviations in parentheses. Values of GDP per capita, Tertiary Schooling, Services, Oil reserves, and Population are for 2009.

The discrepancy in enrollment between the two groups of countries is even more striking if we use the differences between shares of law and science graduates, which show the *relative attractiveness* of different fields of study. For countries with weaker institutions, the average of such differences is positive and equals 1.43 percentage points, whereas for countries with stronger institutions it is negative and equals 5.52 percentage points. We treat this difference as yet another dependent variable whose distribution is closer to normal than the distributions of separate enrollment data for law and science.

Empirical Evidence

We start with estimating cross-country regressions, relating the allocation of talent to indexes of institutional quality, which are as follows:

$$(Un)productive\ Activities_{\ i} = \beta_0 + \beta_1\ Institutional\ Quality_i + \beta_2\ X_i + \varepsilon_i, \quad (6)$$

where $(Un)productive\ Activities$ measures reflect the allocation of talent between subject areas of post-secondary education, $Institutional\ Quality$ is one of the indexes listed in the previous

section, X_i is the vector of additional covariates serving as control variables, and ε_i is the error term. The coefficient of interest is β_1 capturing the impact of institutions on the allocation of talent.

The set of control variables reflects factors other than institutions that could possibly influence the allocation of talent and that are commonly used in similar cross-country analyses.[11] First, we control for GDP per capita since it is plausible that wealthier and poorer countries have different reward structures which are not directly related to the quality of institutions, Furthermore, it is also conceivable that more economically advanced countries are able to afford more "capital-intensive" education in the sciences, and this supply-side effect could have an impact on the allocation of talent. Second, we control for GDP structure measured by the share of services in GDP, which could be correlated with the demand for different professions. Third, there could be a link between the size and structure of the student body, and hence we control for the aggregate enrollment in tertiary education.

Allocation of talent could be affected by natural resources (Gylafson 2001; Alexeev and Conrad 2011). In particular, a massive resource sector could suppress investments in human capital and increase the relative attractiveness of rent-seeking over productive activities, which is a part of the "resource-curse syndrome". We use data on oil reserves from the CIA World Factbook online[12] as a control variable to account for such a link (in some specifications this variable was replaced by the share of natural-resource rents in GDP, with similar effects). Our controls also include population (as a proxy for market size) and an ethnic fractionalization index derived by Alesina (2003). To eliminate the possible impact of economic inequality, we include as yet another control variable the Gini coefficients obtained from the United Nations Statistical Database[13]. The trade-to-GDP ratios reflect the openness of national economies. Finally, we control for the percentage of post-secondary degree holders who emigrate to other countries (obtained from the WDI) which could potentially "divorce" educational choices from the quality of national institutions.

In the first specification, we estimate model (1) with the share of law graduates as a dependent variable and report these results in Table 2. In the first column with no control variables, the coefficient of the Rule of Law Index is, as expected, negative and highly significant. When we add one after the other our control variables (columns (2) to (8)), the negative association between institutional quality and law school graduation remains highly significant and grows in magnitude.

[11] See e.g. Barro 1991; Knack and Keefer 1995; Hall and Jones 1999; La Porta et al. 1999; Acemoglu, Johnson, and Robinson 2001; Rodrik, Subramanian, and Trebbi 2004.

[12] www.cia.gov/library/publications/the-world-factbook/index.html

[13] http://data.un.org/

Among the control variables, oil reserves have a positive and mildly significant coefficient, which is consistent with the impact of the "resource curse" on the allocation of talent. The coefficient of the openness index is also significant and negative, perhaps reflecting the well-established contribution of international trade to the global competitiveness of the national economy (Frenkel and Romer 1999), which reduces opportunities for rent-seeking. Finally, the coefficient of emigration of university graduates is negative and significant at the 10% level – the possibility to seek employment abroad reduces the appeal of studying law. One explanation is that such education is country-specific,[14] but another possible reason is that the option to seek employment in countries with better institutions increases the incentive to obtain directly productive skills.

Table 2.OLS Regressions for Share of Law School Graduates

	Dependent variable: *Share of Law graduates*								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rule of Law	-0.380***	-0.530***	-0.589***	-0.578***	-0.581***	-0.563***	-0.486***	-0.487***	-0.466***
	(0.100)	(0.161)	(0.172)	(0.168)	(0.171)	(0.170)	(0.168)	(0.165)	(0.119)
Log GDP per capita		0.218	0.218	0.207	0.232	0.0571	0.157	0.167	-0.0461
		(0.170)	(0.167)	(0.174)	(0.181)	(0.194)	(0.220)	(0.218)	(0.128)
School Tertiary		-0.335	-0.422	-0.433	-0.366	-0.0516	-0.581	-0.882*	0.609*
		(0.516)	(0.471)	(0.471)	(0.481)	(0.461)	(0.514)	(0.519)	(0.359)
Services, % of GDP			0.777	0.837	0.776	1.500	1.466	1.411	1.770**
			(1.014)	(1.040)	(1.053)	(1.060)	(1.046)	(1.009)	(0.832)
Log Oil reserves				0.00545	-2.57e-05	0.0626**	0.0542	0.0462	0.0575**
				(0.0259)	(0.0255)	(0.0307)	(0.0375)	(0.0354)	(0.0238)
Ethnic Fractionalization					0.285	0.327	0.286	0.338	-0.116
					(0.542)	(0.509)	(0.503)	(0.500)	(0.342)
Log Populaion						-0.219***	-0.357***	-0.405***	-0.178***
						(0.0779)	(0.0886)	(0.0873)	(0.0596)
Gini coefficient							0.925	0.767	
							(0.0134)	(1.318)	
Trade to GDP ratio							-0.526**	-0.555**	
							(0.00228)	(0.219)	
Emigration rate of tertiary educated, %								-0.0167*	
								(0.00842)	
Constant	0.109	-1.707	-2.123	-2.072	-2.379	1.947	3.726	4.925*	1.749
	(0.105)	(1.362)	(1.319)	(1.337)	(1.470)	(2.125)	(2.658)	(2.625)	(1.571)
Observations	95	95	95	95	95	95	81	81	87
R-squared	0.145	0.165	0.171	0.171	0.175	0.230	0.322	0.365	0.278

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[14] We owe this observation to Michael Alexeev.

An inspection of post-estimation residuals reveals several outliers which represent mostly low- and lower middle-income countries with weak institutions, such as Angola, Cameroon, Colombia, Madagascar, Mauritania, Mozambique, Swaziland and Malta. To ensure that our results are not driven by outliers, we exclude them from the sample and report this estimation in column (9). The Rule of Law Index remains statistically significant at the 1% level with a slightly lower coefficient: a increase of one standard deviation in the rule of law is associated with a decrease of 0.47 standard deviations in the share of law graduates. The scatter plot for this estimation is shown in Figure 1.

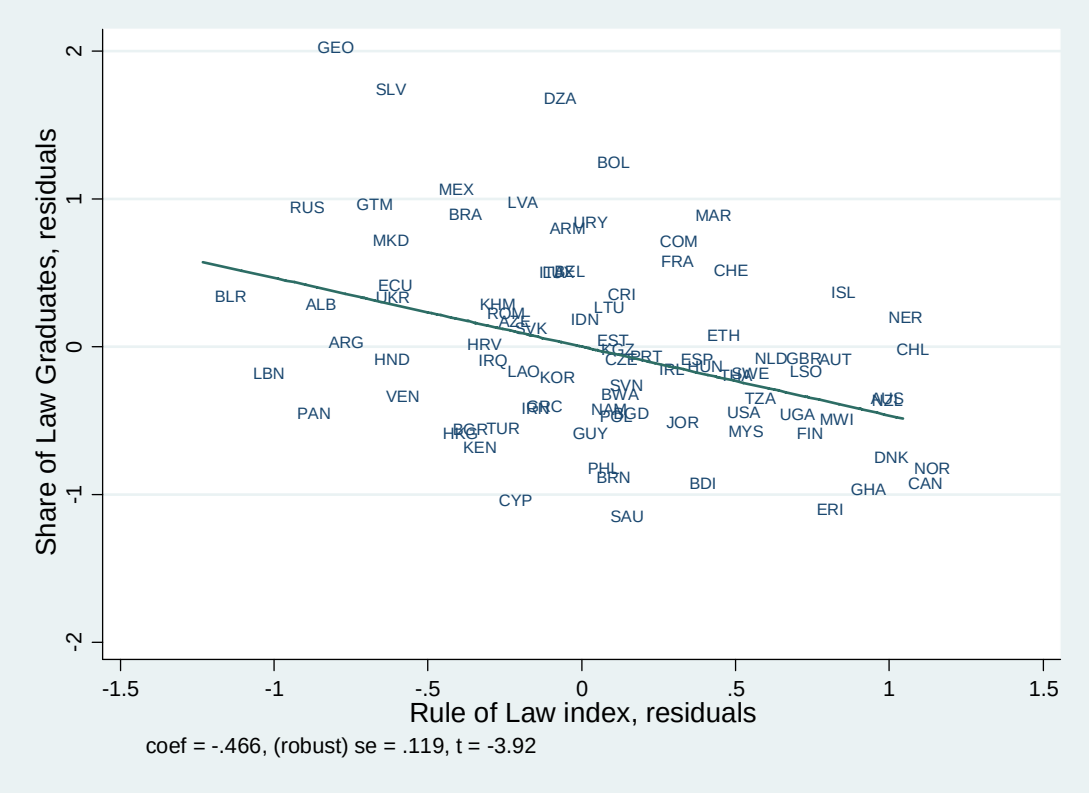

Figure 1. Quality of Institutions and Graduation in Law

In the next regression (Table 3) the dependent variable is the share of science graduates, while the procedure otherwise remains the same. This time the coefficient of interest is positive, as expected, and in most specifications significant at the 1% or 5% levels. On average across specifications, an improvement of one standard deviation in the rule of law, holding other factors constant, is associated with an increase of 0.25 standard deviations in the share of science graduates. Figure 2 shows the scatter plot for column (8) with outliers eliminated.

Table 3. OLS Regressions for Share of Science Graduates

	Dependent variable: *Share of Science graduates*								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rule of Law	0.234***	0.257***	0.205*	0.258**	0.258**	0.252**	0.262**	0.263**	0.326***
	(0.0740)	(0.0970)	(0.106)	(0.120)	(0.120)	(0.118)	(0.117)	(0.115)	(0.0919)
Log GDP percapita		0.194	0.194	0.134	0.137	0.191	0.250	0.247	-0.000884
		(0.137)	(0.132)	(0.142)	(0.148)	(0.148)	(0.179)	(0.182)	(0.110)
School Tertiary		-1.261**	-1.339**	-1.395**	-1.386**	-1.482***	-1.179**	-1.093*	-0.470
		(0.565)	(0.574)	(0.574)	(0.563)	(0.558)	(0.495)	(0.554)	(0.293)
Services, % GDP			0.700	1.020	1.012	0.789	0.235	0.250	-0.0459
			(0.744)	(0.714)	(0.707)	(0.746)	(0.736)	(0.750)	(0.599)
Log Oil reserves				0.0289	0.0281	0.00887	-0.0119	-0.0096	0.00421
				(0.0211)	(0.0226)	(0.0272)	(0.0286)	(0.0281)	(0.0214)
Ethnic Fractionalization					0.0378	0.0249	0.493	0.478	0.125
					(0.356)	(0.360)	(0.380)	(0.384)	(0.291)
Log Populaion						0.0674	0.114**	0.128**	0.0773*
						(0.0530)	(0.0509)	(0.0485)	(0.0425)
Gini coefficient							-0.0210	0.0243	
							(0.845)	(0.833)	
Trade to GDP ratio							0.289	0.297	
							(0.248)	(0.248)	
Emigration rate of tertiary educated, %								0.00478	
								(0.0053)	
Constant	-0.240***	-1.487	-1.861	-1.594	-1.635	-2.964*	-4.487**	-4.83**	-1.453
	(0.0718)	(1.044)	(1.141)	(1.211)	(1.307)	(1.544)	(1.935)	(1.850)	(1.349)
Observations	95	95	95	95	95	95	81	81	90
R-squared	0.102	0.199	0.208	0.223	0.223	0.233	0.339	0.346	0.211

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

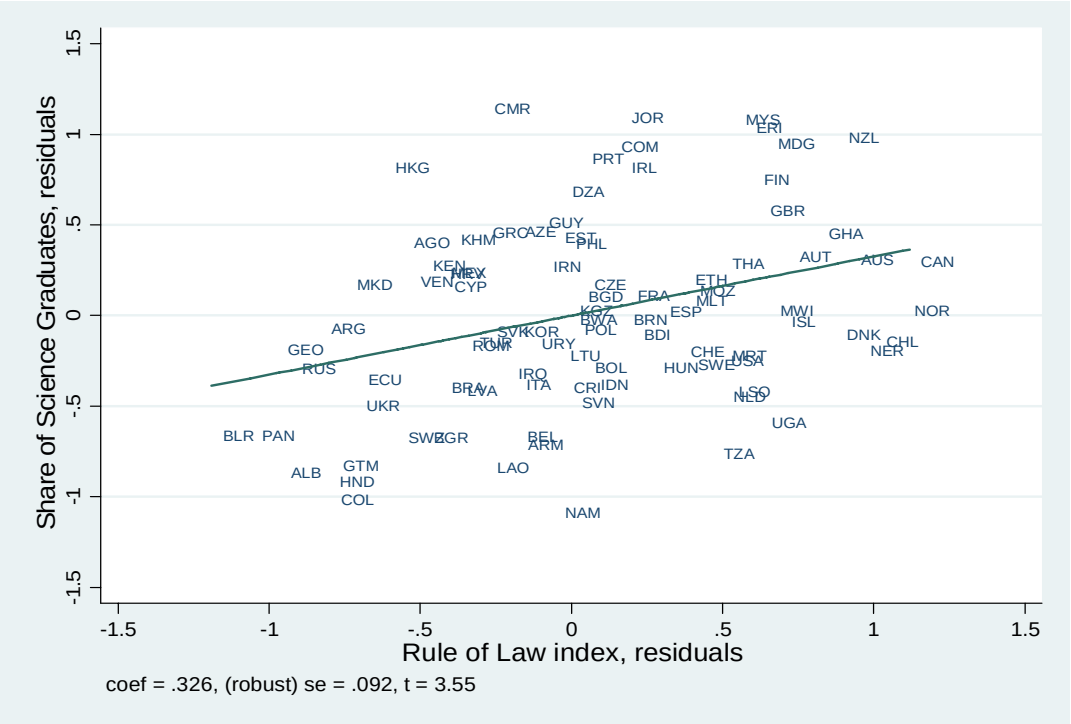

Figure 2. Quality of Institutions and Science Graduates

Since the quality of institutions is negatively associated with the share of law students and positively associated with the share of those majoring in sciences, the difference between these two shares should be particularly sensitive to institutional quality. We test this for all four measures of institutional performance listed in the previous section and present in Table 4 the estimation results with main control variables included.

Table 4.OLS Regressions for Difference between Shares of Law School and Science Graduates

	Dependent variable: *Difference between Shares of Law and Science graduates*			
	(1)	(2)	(3)	(4)
Rule of Law	-0.552***			
	(0.146)			
Government Effectiveness		-0.387**		
		(0.152)		
Control for Corruption			-0.383***	
			(0.117)	
Private Property Protection				-0.294**
				(0.133)
Log GDP percapita	-0.116	-0.188	-0.228	-0.339*
	(0.170)	(0.188)	(0.164)	(0.187)
School Tertiary	1.152**	1.153**	1.140**	1.013
	(0.561)	(0.575)	(0.569)	(0.696)
Services, % GDP	0.298	0.0628	0.218	0.101
	(0.873)	(0.941)	(0.890)	(0.971)
Log Oil reserves	0.0318	0.0440	0.0520*	0.0589**
	(0.0307)	(0.0306)	(0.0302)	(0.0295)
Ethnic Fractionalization	0.182	0.236	0.144	0.0169
	(0.421)	(0.432)	(0.435)	(0.518)
Log Populaion	-0.190***	-0.179**	-0.208***	-0.219***
	(0.0671)	(0.0682)	(0.0658)	(0.0739)
Constant	3.487*	4.060*	4.777**	7.135***
	(1.994)	(2.127)	(1.848)	(1.995)
Observations	95	95	95	83
R-squared	0.310	0.246	0.266	0.301

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

All four indexes of institutional performance are strongly negatively associated with the dependent variable, which is consistent with our hypotheses. The strength of this connection can be seen from the fact that a one standard deviation increase in the Rule of Law Index is associated with a 0.55 standard deviations decrease in the difference between the shares of law and science

graduates. The scatter plot for the estimation with the Rule of Law Index as the dependent variable further illustrates this clearly expressed link.

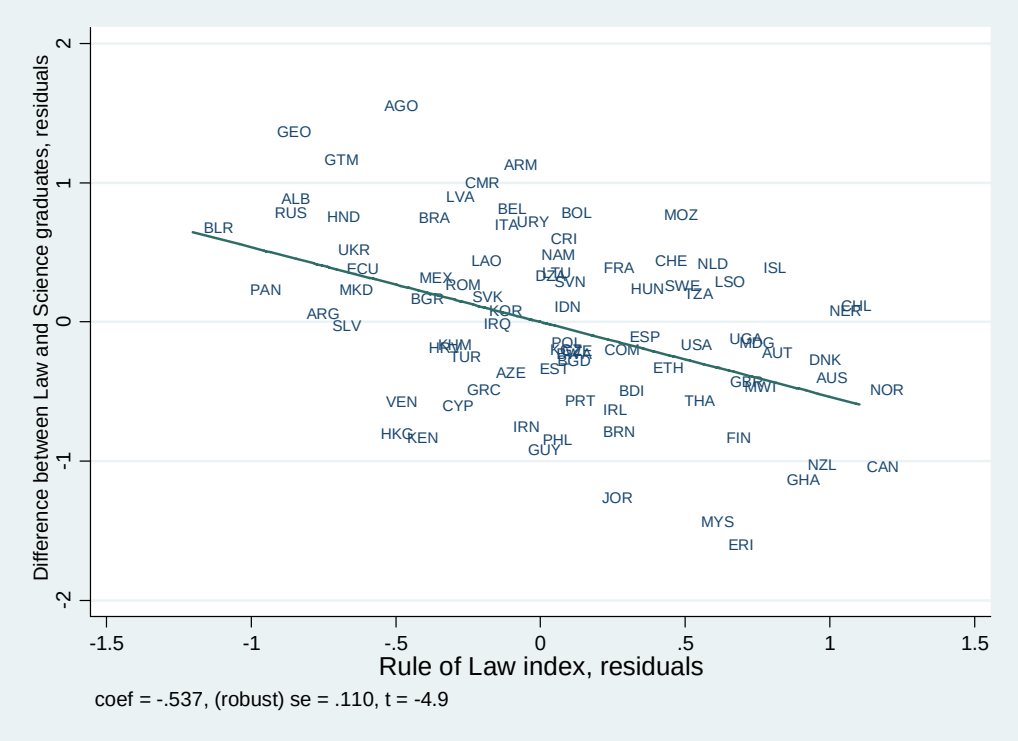

Figure 3. Quality of Institutions and Difference between Law and Science Graduates

We use various modifications of our empirical model to check the robustness of the above findings, particularly to address the concern that our control variables do not fully eliminate an omitted variable bias that could be expected for the extremely diverse group of countries in our sample. To do so we reduce the sample to various more homogeneous sub-groups and estimate model (6) for such sub-groups with the Rule of Law Index as a measure of institutional quality and the difference between law and science graduates as the dependent variable. First, we restrict our estimation to poorer countries by excluding OECD and high-income non-OECD countries (according to the World Bank's classifications). Next, we perform the opposite exercise by retaining only the wealthier part of the sample. The two other estimations are confined to former colonies of European powers and to post-communist transition countries in Central and Eastern Europe and the former Soviet Union (we will return to these subgroups in Section 5).

Table 5. Robustness Checks

	Dependent variable: *Difference between Shares of Law and Science graduates*					
	Without OECD and High-Income Countries	Without Low-Income Countries	Post-Communist Countries	Former European Colonies	Full Sample with dummy for Asia	Full Sample with dummy for Africa
	(1)	(2)	(3)	(4)	(5)	(6)
Rule of Law	-0.697***	-0.488***	-0.912***	-0.737***	-0.636***	-0.631***
	(0.258)	(0.181)	(0.148)	(0.232)	(0.140)	(0.165)
Log GDP per capita	0.0930	-0.368	-0.432**	0.0665	0.00175	-0.0149
	(0.188)	(0.239)	(0.158)	(0.203)	(0.163)	(0.184)
School Tertiary	0.307	1.210**	1.421***	0.0892	0.995*	1.354**
	(0.575)	(0.557)	(0.398)	(0.989)	(0.545)	(0.567)
Services, % GDP	0.680	0.804	3.946***	1.095	-0.613	0.397
	(1.055)	(0.792)	(0.973)	(1.213)	(0.961)	(0.878)
Log Oil reserves	0.0577	0.0360	-0.0205	0.0654	0.0153	0.0301
	(0.0427)	(0.0330)	(0.0486)	(0.0440)	(0.0312)	(0.0310)
Ethnic Fractionalization	0.435	0.00826	-2.127***	0.264	-0.0105	0.115
	(0.460)	(0.556)	(0.607)	(0.529)	(0.369)	(0.417)
Log Populaion	-0.288***	-0.198**	-0.271*	-0.210**	-0.133*	-0.187***
	(0.0925)	(0.0787)	(0.130)	(0.0999)	(0.0733)	(0.0671)
Asia					-0.777***	
					(0.223)	
Africa						0.421
						(0.320)
Constant	3.129	5.729**	6.363**	1.945	2.408	2.330
	(2.554)	(2.655)	(2.404)	(2.583)	(1.988)	(2.201)
Observations	61	81	20	49	95	95
R-squared	0.29	0.36	0.833	0.33	0.41	0.32

The coefficient of the Rule of Law Index is negative and significant at the 1% level across all of the above specifications. The value of this coefficient is higher for poorer countries, former colonies, and transition nations (more on this later in the paper), than for the sample at large.

Multi-country cross-sectional regressions are often suspected of an endogeneity bias that could be caused, apart from omitted variables, by measurement errors (which are likely to affect institutional performance indexes) and especially by simultaneity. It could be argued that the allocation of talent is not only driven by institutions, but also affects these, perhaps due to political pressure from organized interests demanding better conditions for certain trades and activities, or due to entrenched cultural attitudes, such Baumol (1990) suggests, which could impact institutions

(Tabellini 2008). Endogeneity bias could render OLS estimations inconsistent, and such a problem is usually remedied by using appropriate instrumental variables and 2SLS estimations.

Since La Porta et al (1997, 1998), legal origins (legal traditions, law families) have been commonly used as instruments in cross-country institutional analyses (see the literature review in La Porta et al 2008). The main dichotomy in legal origins is between common and civil law systems: it is shown that the former has clear advantages over the latter in protecting the rights of investors, quality of economic regulation, administration of justice, and overall protection of property rights (La Porta et al 2008), which makes legal origins a relevant instrument for institutions. Moreover, legal origins affect a number of important economic outcomes (financial sector conditions, capital and labor markets, media freedoms, incidences of corruption, size of the informal sector, etc.) and it is has been shown that such impact is mediated by institutions (ibid).

La Porta et al (2008) express reservations about using legal origins as instruments because they affect the economy in a variety of ways, some of which might not be captured by institutional variables entering 2SLS models. This is a valid concern in our case, since the type of legal system obviously has a direct effect on the administration of justice, courts, law-making etc., and hence on the size of legal profession. This direct influence compromises the exogeneity of legal origins, making them unsuitable as an instrument in our analysis. Nonetheless legal origins can still be used to reinforce our main argument that the quality of institutions matters for the allocation of talent. Indeed, since the adversarial legal proceedings in the common-law system involve much more jurists than inquisitorial ones under the civil-law system (Tullock 1975), the *direct* impact of legal origins on the allocation of talent is opposite to the *indirect* one, working through the institutions. The latter, however, strongly dominates over the former: the average percentage of law school graduates in our sample in civil-law countries is 7.24, whereas in common law countries (where trials are *more* "lawyer-intensive") the percentage is 2.99. This difference of 4.25 p.p. is significant at the 1% level. In other words, the impact of institutions (shaped by legal origins) on the allocation of talent is strong enough to prevail over the counteracting immediate influence of the type of legal system on the demand for trial lawyers.

To further test the established link between institutions and the allocation of talent, we now turn to two "natural experiments": a) colonial conquest; and, b.) the formation and collapse of command economies, followed by their transition to a free market.

Natural experiments

Acemoglu, Johnson, and Robinson (2001) observed that European powers had established vastly different institutional regimes in their former colonies, some of which protected private property rights while others facilitated the extraction and appropriation of rents. Moreover, such discrepancy proved to be remarkably resilient and sustained itself over the centuries and well into the present era. A plausible root cause of the divergence of institutional regimes is the mortality of European settlers: in some colonies, extreme climate and tropical diseases caused very high mortality among the settlers, making them consider such colonies as "remotely operated assets" and crafting institutions accordingly. Conditions in other colonies (most notably in "New Europe", consisting of North America, Australia, and New Zealand) with lower mortality rates proved to be more acceptable for Europeans, and hence settlers established good institutions there to serve their own needs. The sustainability of such institutional regimes has been ensured by a combination of political and cultural mechanisms, making settler mortality a good candidate for instrument to explain today's institutions while hopefully eliminating endogeneity bias.

To test this instrument in our case, we restrict the full sample to former colonies and perform 2SLS estimations for all four measures of institutional quality, using settler mortality data (from Acemoglu, Johnson, and Robinson 2001) as an instrumental variable. Estimation results are reported in Table 6.

Table 6.Settler Mortality as an Instrumental Variable (the case of former colonies)

	Panel A. Second Stage			
	Dependent variable: *Difference between Shares of Law and Science graduates*			
	(1)	(2)	(3)	(4)
Rule of Law	-1.533			
	(0.921)			
Government Effectiveness		-1.526**		
		(0.702)		
Control for Corruption			-1.413	
			(0.918)	
Private Property Protection				-0.931**
				(0.447)
Log of GDP per capita	0.471	0.627	0.495	0.828*
	(0.452)	(0.428)	(0.499)	(0.483)
School Tertiary	0.336	-0.0628	0.771	0.279
	(2.159)	(1.791)	(2.302)	(1.463)
Services, % of GDP	1.778	1.616	1.587	-0.604
	(2.034)	(1.849)	(2.202)	(1.487)
Log of Oil reserves	0.0395	0.0543	0.0361	0.0655
	(0.101)	(0.0873)	(0.108)	(0.0766)
Ethnic fractionalization	0.0448	0.284	0.358	0.967
	(0.833)	(0.698)	(0.971)	(0.932)
Log of Populaion	-0.263	-0.183	-0.223	0.0285
	(0.186)	(0.163)	(0.157)	(0.212)
Constant	-0.964	-3.409	-1.929	-1.709
	(6.398)	(5.792)	(6.446)	(4.921)
Observations	35	35	35	35

	Panel B. First Stage			
	Rule of Law	*Government Effectiveness*	*Control for Corruption*	*Private Property Protection*
Log of Settler Mortality	-0.245	-0.246*	-0.266	-0.403*
	(0.156)	(0.140)	(0.162)	(0.207)
Log of GDP per capita	0.285	0.389*	0.326	0.852**
	(0.234)	(0.222)	(0.244)	(0.313)
School Tertiary	0.639	0.381	1.002	0.992
	(0.915)	(0.785)	(0.907)	(0.967)
Services, % of GDP	1.144	1.043	1.107	-0.674
	(1.222)	(1.309)	(1.294)	(1.270)
Log of Oil reserves	-0.0553	-0.0458	-0.0624	-0.0631
	(0.0534)	(0.0532)	(0.0563)	(0.0656)
Ethnic fractionalization	0.297	0.455	0.545	1.480**
	(0.553)	(0.445)	(0.599)	(0.630)
Log of Populaion	0.00684	0.0595	0.0363	0.325***
	(0.0955)	(0.0865)	(0.0887)	(0.116)
Constant	-2.411	-4.025	-3.301	-4.772
	(3.001)	(2.613)	(3.008)	(3.765)
Observations	35	35	35	35
R-squared	0.615	0.707	0.675	0.775
First Stage F-statistics	6.15	9.30	8.02	13.26

The settler mortality instrument is weak for the Rule of Law and Control of Corruption indexes, but it is somewhat stronger for government effectiveness and especially for protection of property rights (which is similar to the institutional performance measures used in Acemoglu, Johnson, and Robison 2001). In the latter case, the coefficient of the fitted explanatory variable still has the expected sign and is significant at the 5% level.

Next we turn to the case of the post-communist countries of the former Soviet Union and Central and Eastern Europe. This sub-sample is of particular interest for our analysis due to its nearly ideal "natural experiment" features. Moscow's domination ensured high uniformity of both institutions and post-secondary educational systems across the region. The nature of economic and political system of the command economy focused higher education on engineering and sciences, whereas law schools were few and far between and somewhat marginal in their appeal for younger talents; the prevailing attitudes and social customs viewed education in sciences as more prestigious and as having more promise for a successful career.[15]

The uniformity of former command economies at the outset of their transition to the free market and the availability of formidable educational capacities in sciences and engineering alleviates the concern that allocation of students across fields of studies is at least in part a "supply-side" phenomenon reflecting the capacities of national university systems to offer education in particular disciplines. The divergence in allocation of talent that ensued could be with greater confidence linked to "demand-side" forces, which in turn reflected the quality of post-communist institutions.

We report the results of OLS estimations from model (6) for the sub-sample of transition countries and the Rule of Law Index as a measure of institutional quality; graduation rates in science and law, as well as the difference thereof, are used as dependent variables.

[15] This perhaps could be construed as a contradiction to our theory, since the institutions of the command economy were obviously quite poor with regard to the protection of property rights, the rule of law, etc. In fact our logic implies that even with bad institutions there is a private sector on which rent-seekers prey. Command economies with totalitarian states do not meet such assumption and are thus exceptions from our rule. As we argue below, these "exceptions" confirmed the rule with particular clarity once central planning was dismantled.

Table 7. OLS Regressions for Post-Socialist Countries

	Share of Law Graduates (1)	*Share of Science Graduates* (2)	*Difference between Shares of Law and Science graduates* (3)
Rule of Law	-0.735**	0.571***	-0.912***
	(0.307)	(0.129)	(0.148)
Log of GDP per capita	-0.286	0.320**	-0.432**
	(0.313)	(0.146)	(0.158)
School Tertiary	0.399	-1.477***	1.421***
	(0.892)	(0.427)	(0.398)
Services, % of GDP	3.992*	-1.845**	3.946***
	(2.099)	(0.819)	(0.973)
Log of Oil reserves	0.0303	0.0490	-0.0205
	(0.0895)	(0.0504)	(0.0486)
Ethnic fractionalization	-0.554	2.224***	-2.127***
	(1.160)	(0.549)	(0.607)
Log of Populaion	-0.246	0.148	-0.271*
	(0.227)	(0.130)	(0.130)
Constant	4.181	-4.827*	6.363**
	(5.001)	(2.596)	(2.404)
Observations	20	20	20
R-squared	0.601	0.735	0.833

All coefficients of institutional quality in the above estimations are of the expected sign and are significant at the 1% level. An inspection of Table 5 (where column (3) is the same as in the above table) shows that, of all groups of countries considered in the paper, the coefficient of the Rule of Law Index is highest for the group of post-communist countries and exceeds the coefficient for the whole sample by more than 60%. The following scatter plot (Figure 4) further illustrates the strong association between the quality of institutions and allocation of talent in the former Soviet Union and Central and Eastern Europe.

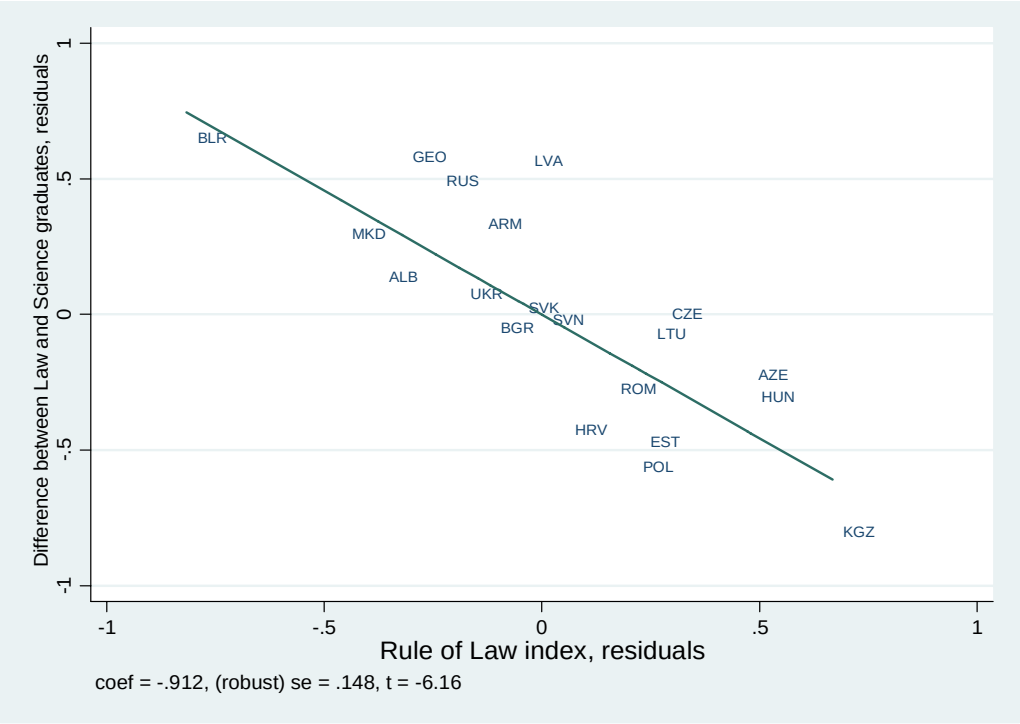

Figure 4. Quality of Institutions and Difference between Law and Science Graduation rates in Post-Communist Countries

Comparisons of different countries that are often neighboring and otherwise comparable further illustrate the "natural experiment" within the group. A case in point is the divergence between Ukraine and Poland. Both countries experienced an explosive growth of interest in the legal profession in the early 1990s to fill the void left by pre-transition educational systems and at this time education in science and engineering suffered a precipitous decline. However, over time the enrollment in law schools in Poland subsided and enrolment in science and engineering recovered numerically as it grew steadily over most of 2000s. Yet no such adjustment has occurred in Ukraine (Figure 5). A stark difference between the two countries can be seen in the numbers of law schools: law degrees are conferred by 16 universities in Poland, whereas in Ukraine the number of such institutions runs into the hundreds.

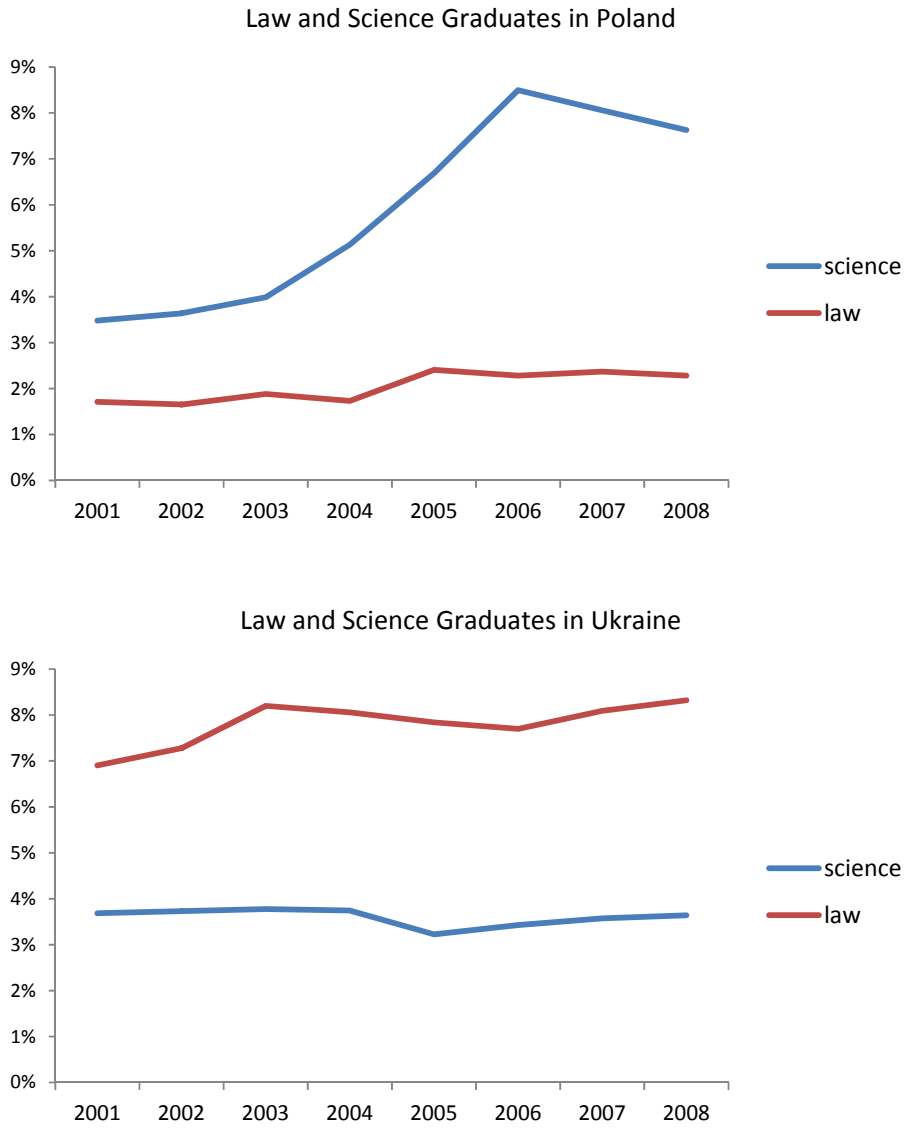

Figure 5. Law and Science Graduation trends in Poland and Ukraine

The case of Russia – ever notorious for its low quality of its institutions (Polishchuk 2012) – further illuminates the link between institutions and the allocation of talent. The following distributions of results from the 2010 Unified State Examinations, Russia's analogy of the SAT, of applicants seeking education in various fields reveals a clear preference of talented youth to law over even the most cutting-edge engineering disciplines (Figure 6).

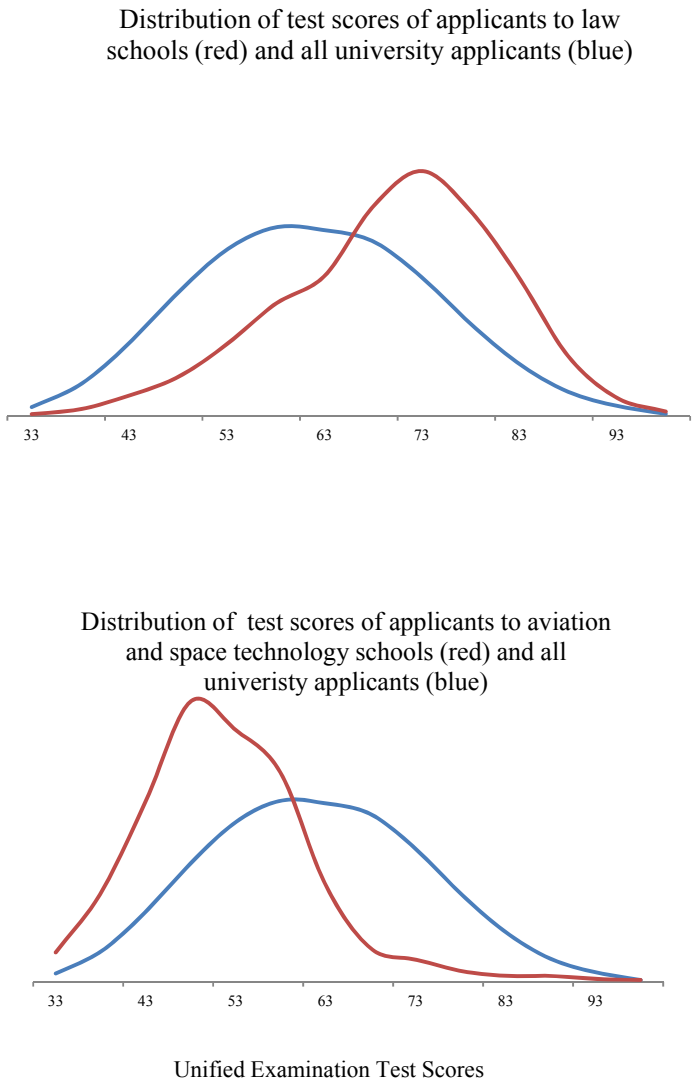

Figure 6. Distribution of Test Scores in Different Fields in Russia

Institutions and Allocation of Stronger Talent

Murphy, Shleifer, and Vishny (1991) stress the importance for economic growth of the occupational choices of the most talented individuals who become leading entrepreneurs in either productive activities or rent-seeking (see also Aghion and Howitt, 2009). Recall that the model set forth in Section 2 predicts that when institutions are poor, rent-seeking will attract a higher proportion of more talented individuals than will the whole pool on average, and at the limit it absorbs nearly all of the best and brightest. On the contrary, when institutions are strong, more talented individuals will show a stronger preference for socially productive activities than on the

average, and at the limit nearly all of the best and brightest will be engaged in those activities. Such a difference in allocation of stronger talent depending on institutional quality is of particular importance for economic growth, and we now turn to testing this effect empirically.

We do not have individual data on talent and occupational choice and continue to treat countries as the unit of our sample, using human capital quality measures as proxies for the talent of university students of a given country. Our source of data is an international database assembled by Altinok and Murseli (2007), who administred tests in mathemtics, sciences, and reading among junior high school students in 104, 79, and 88 countries, respectively, and aggregated the test results in an overall national human capital quality index which we use as a proxy for talent and which is available for 61 countries in our sample.[16]

We divide the sample of countries in two parts at the median of the Rule of Law Index (as we did in Table 1), and next divide both halves at their respective average levels of the national human capital quality measures. Next, we calculate average shares of law graduates for each of the four groups with stronger or weaker instituions and higher or lower human capital levels. The results are presented in Table 8.

Table 8. Quality of Institutions and Strength of Talent

	Weak Institutions	**Strong Institutions**
High Human Capital Index	7.33%	4.24%
Low Human Capital Index	2.88%	3.20%
Significance of the difference	4.44% ***	1.04%
t-statistics	3.76	1.2
Observations	17	44

The table confirms that, for countries with weaker institutions, the share of law graduates in the sub-sample with higher human capital quality is 2.5 times higher than in countries with the same quality of institutions but lower human capital quality. This difference which is consistent with our

[16] Other sources of similar indexes, e.g. Lee and Barro (2001) and Hanushek and Kimko (2000) cover much fewer countries.

theory is strongly pronounced and signifiant at the 1% level. When we compare this to countries with stronger institutions, we observe that, for higher levels of human capital quality, the impact of the quality of institutitons is strong (the share of law graduates drops by more than 40%), and this difference is also significant at 5% level. For countries with lower human-capital quality, improvement of institutions leaves no statistically significant impact on talent allocation, which is also what the theory predicts. Finally, when we restict our attention to the subgroup with stronger institutions, we do not observe a statistically significant difference between enrollment in law schools in countries with higher and lower human capital quality, which is in contrast to the group of countries with poorer institutions.

The predicted impact of quality of human capital on the allocation of talent is particulalry pronounced for the subsample of countries with weak instutions: Figure 7 below clearly shows an increase of enrollment in law schools when human capital quality rises, with Kenya and Tanzania at the lower end of the spectrum and Armenia and Russia at the higher end of the spectrum.

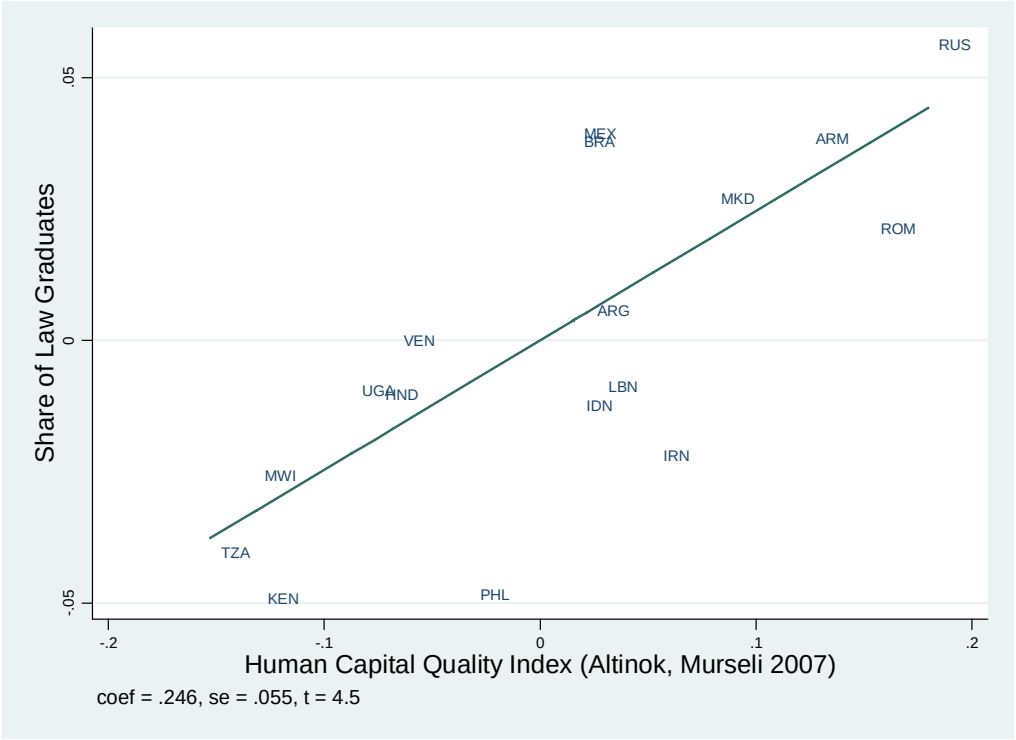

Figure 7. Quality of Human Capital and Allocation of Talent in Countries with Weak Institutions

Allocation of Talent as a Link between Institutions and Growth

Institutions are known for being key factors and drivers of economic growth, and this link is mediated by investments in physical capital. The role of investment is usually established as follows (Knack and Keefer 1995; 1997). First, regression models are estimated with resp. growth and investment as dependent variables and institutions as explanatory ones in order to show that institutions matter for both. Next, a regression model with growth as the dependent variable and institutions *and* investments as explanatory variables are estimated to demonstrate that investments reduce the (residual) impact of institutions or make the latter altogether insignificant. We perform the same exercise with the allocation of talent to prove that this is another essential link between institutions and growth that has largely been neglected in the prior literature. The results are presented in Table 9.

Table 9. Growth, Institutions, and the Allocation of Talent

	Dependent variable: *Average Growth rate of GDP per capita in 2000-2009*					
	(1)	(2)	(3)	(4)	(5)	(6)
Rule of Law in 1996	0.759***	0.681**	0.673**	1.672**	0.601	0.601
	(0.244)	(0.280)	(0.279)	(0.633)	(0.532)	(0.532)
Share of Law Grads		-0.139	-0.136		-1.418***	-1.418***
		(0.195)	(0.197)		(0.312)	(0.312)
Share of Science Grads			0.124		0.0190	0.0190
			(0.228)		(0.962)	(0.962)
School Tertiary	0.288	0.284	0.473	-2.280	-1.580	-1.580
	(0.798)	(0.793)	(0.782)	(2.437)	(3.067)	(3.067)
Services, % of GDP	0.480	0.678	0.569	3.885	8.391***	8.391***
	(1.520)	(1.543)	(1.553)	(2.439)	(2.073)	(2.073)
Log of Oil reserves	-0.0295	-0.0201	-0.0182	0.124	0.130	0.130
	(0.0602)	(0.0608)	(0.0616)	(0.214)	(0.162)	(0.162)
Ethnic fractionalization	-0.175	-0.147	-0.165	-1.997	-2.151*	-2.151*
	(0.842)	(0.836)	(0.839)	(1.615)	(1.088)	(1.088)
Log of Populaion	0.130	0.0989	0.0878	-0.133	-0.271	-0.271
	(0.122)	(0.123)	(0.125)	(0.608)	(0.540)	(0.540)
Log of initial GDP per capita	-0.403	-0.397	-0.449	0.322	-0.374	-0.374
	(0.305)	(0.312)	(0.320)	(0.612)	(0.810)	(0.810)
Constant	2.860	3.184	3.833	-0.274	5.418	5.418
	(3.708)	(3.661)	(3.878)	(10.38)	(12.41)	(12.41)
Observations	94	94	94	20	20	20
R-squared	0.174	0.180	0.183	0.616	0.783	0.783

First we run standard regression of growth rates (averaged for the 2000-2009 period) on the quality of institutions, represented by the Rule of Law Index, and find the coefficient of the latter to be positive and significant at the 1% level (column (1)). Next (column (2)), we include a measure for the allocation of talent, represented by the percentage of law school graduates, and observe that the coefficient of the Rule of Law Index drops by 10% of its initial magnitude and its significance gets weaker. Finally, in column (3) we add another measure for the allocation of talent, represented by the percentage of science graduates, and this leads to a further decline of the impact of institutions. The measures for the allocation of talent in the above regressions have the expected signs, but none of them is significant at the 10% level and lower. Still, this analysis proves that some part of the impact of institutions on economic growth is mediated by the allocation of talent.

To get a sharper version of the same result, we once again restrict our sample to transition countries and estimate the same regression models (columns (4) to (6)). The full impact of institutions on growth more than doubles in magnitude in comparison to the full sample and is significant at the 5% level. However, once measures for the allocation of talent are added into equation, they become significant at the 1% level, whereas the Rule of Law Index loses significance altogether. Therefore, the allocation of talent is a highly important transmission link from institutions to growth for transition economies.

Concluding Remarks

Institutions affect economic behavior and long-term investment decisions are particularly sensitive to the unstitutional quality. Insecure property rights, a weak rule of law, and excessive red-tape all serve to elevate investment risks and suppress physical capital accumulation. We show that institutions also strongly affect investments in human capital and hence the allocation of talent. Market-supporting institutions attract talent to productive activities and this is reflected in the choices of field of study by university students, many of whom select engineering, sciences, medicine, and other similar disciplines. Poor institutions, on the other hand, make rent-seeking more attractive than socially productive activities, which leads to hypertrophied enrollment in law, public administration, and other similar educational programs.

We confirm these patterns by using data on the allocation of talent and institutional quality for about 100 countries of the world and demonstrate the robustness of our findings. For smaller groups of countries, such as transition economies, which share a number of common features and have been

through “natural experiments” that set them on different institutional courses, the link between institutions and the allocation of talent is particularly pronounced.

We also find that socially unproductive distortions of talent allocation caused by poor institutions are greater for more talented individuals, which exacerbates the damage to economic growth and social welfare, since top talents are not generating innovations and otherwise advancing growth, but rather are engaged in re-distributive activities that could be very harmful for economic development. Indeed, we show that, to a significant degree, the link between institutions and development is mediated by the allocation of talent.

It is well known that the private and social returns to education could differ from each other (see, for example, Moretti 2004). In such a case, individual incentives that drive educational choices are not properly aligned with social needs. Much of the literature that deals with such discrepancies emphasizes various externalities as the root cause and implicitly assumes that all educational investments in human capital serve socially productive needs. We point to another important cause of the gap between private and social returns to education, namely when education prepares an individual for rent-seeking.

It is often argued that a discrepancy between social and private returns to education calls for public intervention. This general dictum clearly holds in our case: Public policies and reforms that repair faulty institutions would direct talent towards socially productive activities and thereby reduce the gap between private incentives and social needs in human capital accumulation.

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