Historical European Institutions, Human Capital and Development

Tiago Miguel Guterres Neves Sequeira
University of Coimbra, Centre for Business and Economics Research, CeBER and Faculty of Economics

Daniel Filipe Videira Murta
University of Coimbra, Centre for Business and Economics Research, CeBER and Faculty of Economics

Marcelo Serra Santos
CeBER

CeBER Working Papers
No. 11 / 2020

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Tiago Neves Sequeira*,§
e-mail: tiago.n.sequeira@fe.uc.pt

Daniel Murta*,§
e-mail: danmurta@fe.uc.pt

Marcelo Santos*,§
email: marcelosantos@uc.pt

Abstract

The literature on development has pointed out some deeply-rooted determinants of current economic development. Most research on the field has been devoted to developing countries or specific to single countries. We focus on deeply-rooted determinants of development of European regions, in particular on the influence of human capital. Following an identification strategy using instrumental variables, we approach the historical links between current human capital and the presence of universities and trade guilds in medieval times. We show that human capital is an important determinant of income disparities across European regions, and that trade guilds and universities at 1500 are good instruments to track the exogenous influence of the current levels of human capital. This finding shows robustness to several econometric specifications.

Keywords: development, regions, historical determinants of development

JEL code: I25, P16, O10

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* University of Coimbra, CeBER, Faculty of Economics, Avenida Doutor Dias da Silva, 165, 3004-512 Coimbra, Portugal

§ University of Coimbra, CeBER, Faculty of Economics, Avenida Doutor Dias da Silva, 165, 3004-512 Coimbra, Portugal

** This work has been funded by national funds through FCT – Fundação para a Ciência e a Tecnologia, I.P., Project UIDB/05037/2020.

1. Introduction

The literature on the deeply-rooted determinants of development has been greatly developed in the last decade, and is mostly empirically based. Hall and Jones (1999) demonstrated the importance of social infrastructure, a composite measure of rule of law and other institutional measures. Glaeser *et al.* (2004) followed that path. Rodrick *et al.* (2004) showed evidence for the supremacy of institutions related to geography and integration as determinants of economic development. Furthermore, Olsson and Hibbs Jr. (2005) showed the strong influence of geographical and biogeographical factors in determining the current level of development.

The effects of ethnolinguistic fractionalization were examined by Easterly and Levine (1997) and Alesina *et al.* (2003). The influence of genetic diversity on ethnolinguistic fractionalization has been studied by Ahlerup and Olsson (2012). Moreover, the historical impact of sociocultural factors has been highlighted by Tabellini (2008), and Guiso *et al.* (2009). Ashraf and Galor (2013a, b) report a significant relationship between genetic diversity determined ancestrally and current economic development.

Most of these contributions focus on the explanation of the development of developing and poor countries or within countries (e.g. in Naritomi et al, 2012; Oto-Peralías and Romero-Avila, 2015), while we will focus on richer countries.

In related literature on institutions, Sokoloff and Engerman (2000) and Acemoglu *et al.* (2005) have stressed the role of colonialism and inherited institutions. Galor and Klemp (2014) probe the historical roots of human capital investments, based on genealogical records of a huge sample of Canadian households. They find that a predisposition towards investment in child quality establishes the incentives for long-run reproductive success and progress in education.

In particular, Acemoglu *et al.* (2014) explain differences in development of poorer countries and regions with the role played by human capital. We follow Acemoglu *et al.* (2014)'s footsteps in tracking the influence of human capital in the development. But, unlike those authors, we take that approach and apply it to regions that were not colonized once, which are richer, are mainly European and have different historic traits. We will seek to ascertain how important human capital is as a determinant of income disparities across European regions. And whether trade guilds and universities at 1500 are good instruments to mirror current levels of human capital. Several econometric specifications are present to challenge the robustness of these links.

Naturally, ours is also an empirical work in nature. Thus, in Section 2 we explain the data and its sources, the specification strategy, including the instrumental variables strategy. Section 3 presents regression results and Section 4 concludes.

2. Data and Specification

2.1. Data collection and instruments

We collected data from several sources. First, we used the database for regions made available in Acemoglu *et al.* (2014), containing current data for income and human capital (years of education). Geographical variables such as temperature and distance to coast were also taken from Acemoglu *et al.* (2014). As this database was used to study developing regions of the world, it did not include some variables for the developed regions, which we were keen on. Various other sources were used. To create a dummy variable on a region being landlocked, we used maps of NUTS II regions, across all developed countries in the database. For computing population density in 1500, using data from every major city in each NUT II in 1500, our source was Bairoch *et al.* (1988). In some of the regressions we include in the set of instruments the predominant religion in 1500, based on Shepherd (1923). We constructed dummies for catholic, protestant, orthodox and mix of religions, although we used just a subset of those in the instrument matrix.[1]

Furthermore, we use the presence of medieval universities and corporation guilds in each region as instruments for human capital. Based on economic history (Cantoni and Yuchtman, 2012; de la Croix et al., 2018), we argue that

[1] A database and a technical appendix describing its construction is available on request.

those were foundations of accumulation and diffusion of knowledge. In fact, Cantoni and Yuchtman (2012) argue that law curricula in medieval universities, and the consequent development of legal and administrative institutions, were important channels linking universities and denser economic activity. Additionally, de la Croix et al. (2018) credit the emergence of guilds in Europe, and their intrinsic practices, such as journeymanship, as main drivers Europe's rise relative to other regions in the globe, that continued to rely on family ties in training young people for professions.

Universities were centers of study and dissemination of scholastic knowledge, where state-of-the-art law, mathematics, geometry, astronomy, and also grammar, rhetoric and logic were shared among scholars and students (Willis, 1984). Valero and Van Reenen (2019), e.g. show that the increases in the number of universities are positively associated with future growth of GDP per capita, at the regional level. Using some historical data dating back to the XIXth century, Diebolt and Hippe (2019) find that regional human capital in the past is a key factor explaining current regional disparities in innovation and economic development. When compared with these contributions, ours rests on measuring the long-run effect of human capital on current regional development, using universities and guilds that were founded until the year 1500 to uncover the exogenous effect of human capital on per capita income.

For example, Universities in Portugal and Spain are thought to have been crucial for the gathering and accumulation of knowledge that supported the first discovery voyages across the Atlantic and beyond, that laid the ground for an era of globalization, through trade. Once those countries and their universities came to be dominated by the Inquisition (the latter becoming more focused on philosophical and theological studies and refusing receive protestant professors), the northern European universities replaced the Iberian ones at the knowledge frontier, at the time. Unsurprisingly, northern European countries then overcame the Iberian ones in technological knowledge (Willis, 1984).

Guilds are institutions that regulated apprenticeships and accordingly contributed to the development of state-of-the-art techniques in several professions (de la Croix et al., 2018). We argue that, for Europe, both ancient institutions (Universities and Guilds) are the most important predecessors of schooling and learning-by-doing, respectively. In turn, essential elements of human capital, and thus could serve as good instrumental variables to uncover the exogenous effect of current human capital in current income.

Additionally, a direct effect of the presence of those institutions far pre-dating the industrial revolution on current *per capita* income is unlikely to be found.

To collect data on the foundation year of universities we use the World Higher Education Database (WHED). WHED is an online database published by the International Association of Universities in collaboration with UNESCO. It contains information on higher education institutions that offer at least a three year or more professional diploma or a post-graduate degree. In 2010, there were 16,326 universities across 185 countries meeting this criterion. Our variables related to universities are dummies for the existence (with a 1 value) of an university in a given region for 1200, 1300, 1400, 1450 and 1500.

For Guilds, we used a very recent database build by Ogilvie (2019). This database includes information of the year of creation, town, and craft of each European guild. Our variables related to guilds are dummies for the existence (with a 1 value) of a guild in a given region for 1200, 1300, 1400, 1450 and 1500.

For both Universities and Guilds we reached the conclusion that the best instruments to be used for current level human capital are their presence in 1500.

A good instrument is one that is correlated with the instrumented variable (significantly) and one that isn't regarded as a good direct determinant of the outcome (or instrumented variable). As we have already argued, we should not expect a direct effect of the medieval universities and guilds in current income per capita. In fact, we argue that those pre-globalization institutions were determinants of greater incentives to accumulate human capital nowadays. At the regional level, those institutions shaped regional intellectual and entrepreneurship culture that persisted throughout centuries, leading the ground for learning-by-doing and knowledge institutions (see Figure 1).

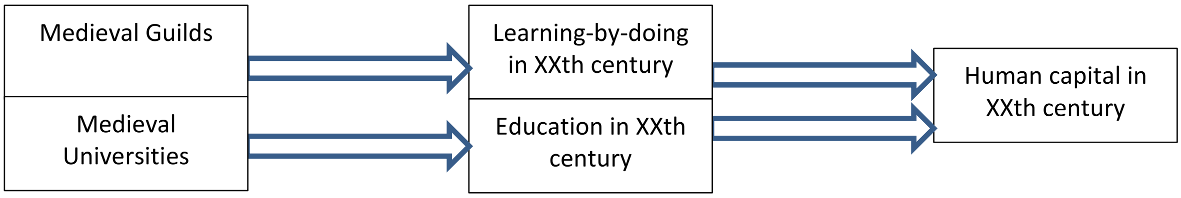

Figure 1 – Argument for the historically-rooted human capital institutions in Europe

Although the existing historical literature makes the link from guilds and medieval universities to schooling credible, there are the usual challenges to the exclusion restriction. First, despite the above arguments, there may still have existed a residual tendency for universities and guilds to be placed in areas that were more prosperous or that had greater development potential for other reasons. Second, medieval universities and trade guilds may have impacted development today through other mechanisms than schooling. Our main response to these concerns is that to the extent that these potential omitted variable biases are important, they will lead to an upward bias in the estimated returns to human capital, and in our regressions we found a downward bias in OLS estimates.

Figure 2 and 3 show bilateral correlations and F-statistics (from analysis of variance – ANOVA) between the century dummies for the presence of universities and guilds and human capital. This analysis highlights that among the possible dates in which medieval universities and guilds are observed, the 1500 dating is the most appropriate to use as instruments. Figure 2, in particular, shows that correlations between those dummies and current days human capital are increasing as the dummies progress from being dated in

1200 to 1500, with the ones dated in 1500 presenting the highest correlations. Also, these have p-values nearing zero. Figure 3 shows almost the same pattern using a F-statistic coming from the analysis of variance or ANOVA, although in this case for Universities the highest F-statistic is observed for the dummy for Universities in 1350. Combining both analysis we argue that there are strong arguments to select the dummies for 1500 to the baseline analysis.

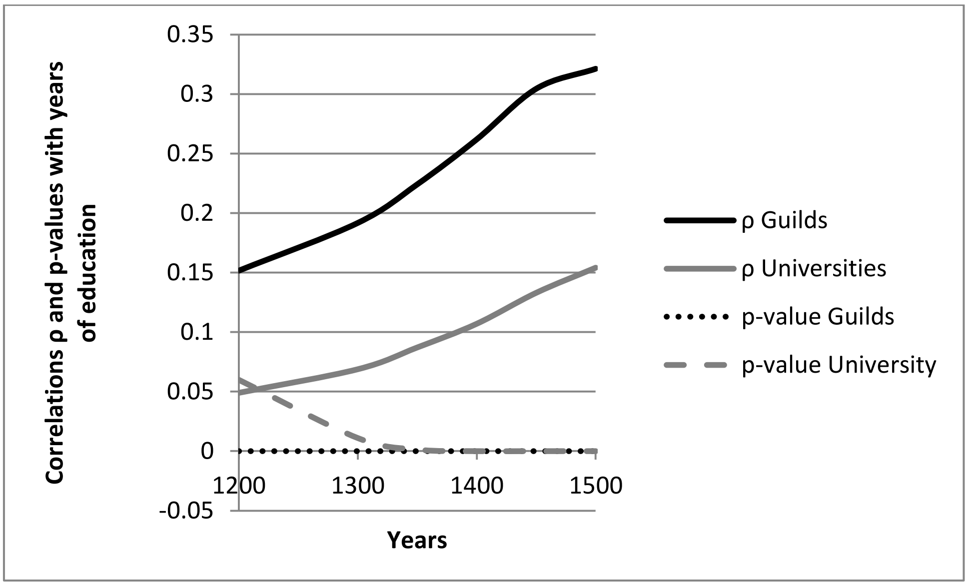

Figure 2 – Correlations ρ and p-values with years of education

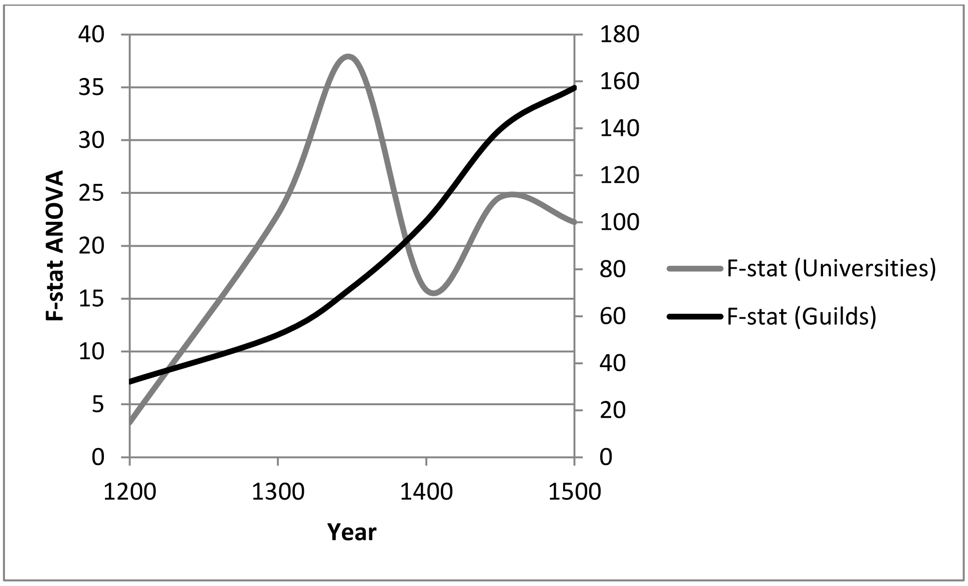

Figure 3 – F-statistics from ANOVA analyzing differences in current human capital with dummies of medieval universities (left-hand scale) and guilds (right-hand scale)

Table 1 presents descriptive statistics for the main variables used in the specification.

Table 1: Descriptive Statistics

	avg	s.d	min	max	Correlation with human capital
Dependent variable					
GDP per capita	8.78	1.14	5.54	11.42	0.8157
Explanatory variables					
Human capital	6.99	3.08	0.22	13.21	--
Temperature	15.12	8.59	-12.73	29.15	-0.6420
Inverse Distance to Coast	0.85	0.15	0.33	1.00	0.1407
Population density in 1500	1.33	2.14	-9.58	6.62	-0.1213
Instruments for Human Capital					
Universities in 1500	0.019	0.14	0.00	1.00	0.1541
Guilds in 1500	0.069	0.14	0.00	1.00	0.3212

2.2. Specification

We estimate the following equation:

$$y = \alpha + \beta_1 edu + \beta_2 temp + \beta_3 temp^2 + \beta_4 inv.Dist.Coast + \beta_5 inv.Dist.Coast^2 + \beta_6 PopDens1500$$

where *y* is GDP *per capita* in 2005, *edu* is the variable of interest, years of education and $\beta_1$measures the macroeconomic returns to education. It is worth noting that this coefficient is around 0.3 in the paper of Acemoglu *et al.* (2014) which applies to developing countries. Also, in the most robust cross-regions (instrumental variables) regression in that paper, the effect of human capital in income differences is not statistically significant (see e.g. their Table 10).

Other covariates are temperature ($temp$), temperature squared ($temp^2$), the inverse of distance to coast ($inv.Dist.Coast$), its square ($inv.Dist.Coast^2$) and the population density of the region in 1500 ($PopDens1500$). As mentioned above, the first four variables as well as the dependent variable come from the database available by Acemoglu *et al.* (2014). Population density in 1500 was constructed by us using data from Bairoch *et al.* (1988).

Throughout the paper, we discuss the introduction of population density of the region in 1500 ($PopDens1500$) as a direct determinant of current development and/or as an additional instrument for human capital

Finally it is worth noting that when compared with the Acemoglu et al. (2014), we are not including the *landlock* variable. In fact, in our case this variable seems to be more appropriate for the less developed countries than for more developed ones, in which transport and trade (or, broadly speaking, functioning markets and integration) are more dependent on terrestrial, river and air transportation than on sea transport. Moreover, *landlock* variable effects may be overlapping those of the distance to coast variables that are already in the regression.

3. Results

In Table 2 we present the main results. With these we want to establish two main points. First, that in well-developed regions of Europe human capital is also a determinant of long-run growth, which allows us to compare this value with the one obtained by Acemoglu *et al.* (2014) for the developing regions. Second, that both the existence of university and guild in 1500 in the region are good instruments for human capital.

Column (1) shows OLS results. Despite the high significance of temperature and population density in 1500 variables, education is also highly significant with a coefficient 0.315, which is in line with the value obtained in Acemoglu *et al.* (2014) [e.g. 0.352]. Columns (2) to (6) present IV regressions with different covariate and instrument sets. These IV regressions always include our main instruments, the presence of universities and guilds. One immediate conclusion is that IV coefficients are higher than the OLS ones, unlike what happens in Acemoglu *et al.* (2014). This seems to indicate that, while in their regressions for developing countries and regions, issues like reverse causality and omitted variable bias may be affecting OLS estimates more than measurement error in education, in our OLS regression this last source of bias dominates. In the regression of column (2) the consistency of the OLS estimations is accepted, tending to indicate that OLS is preferable to IV, as they are more efficient.

In the following regressions, population density in 1500 has been omitted essentially because, due to the result of the weak instruments test in column (2), the instruments are weak when that variable was included in the exogenous set of explanatory variables. The nature of our instruments, which are also measured in the same year of 1500, indicates a possible multicollinearity problem inflating the significance of the population density variable. Nevertheless, if one believes the direct effect of population density in 1500 in nowadays development is not driven by multicollinearity with the instrument set, the conclusion would indicate consistency of OLS estimates that pointed out for a significance of human capital in explaining European development. Following this reasoning and comparing the results in Acemoglu *et al.* (2014), one would conclude that the effect of human capital in developed countries is higher and more significant that that effect in developing countries. Despite of quantitative differences that will be highlighted below, this conclusion would be maintained for the further results driven by instrumental variables approach.[2]

Besides this argument, it has the great advantage of increasing a lot the number of observation and thus the degrees of freedom, since without this variable in regressions, the sample is not limited by the data available in Bairoch *et al.* (1988) for population in 1500.

So, from columns (3) to (6) we drop the population density in 1500 dummy from the explanatory variables set. In column (3), as in column (2) instruments for years of schooling are the presence of universities and guilds in 1500 and this turns out to be our preferred specification. The Haussman test for consistency of OLS is rejected at the 10% level which tends to validate the IV approach.[3] Moreover, the Sargan test of the null that all the instruments are valid is not rejected. Finally, the weak instruments test is higher than 10 which

[2] These conclusions would be maintained if we would have also included landlock dummy as an exogenous explanatory variable.

[3] This is also confirmed by the control function test also presented in the column.

indicates that instruments are quite appropriate. In this specification, the coefficient of education is very high (0.538), and both higher than the OLS estimate and those of Acemoglu *et al.* (2014). In column (4), we present results from the same regression as (3) but we considered alternative instruments: the presence of universities and guilds in 1450 (and not in 1500). However, in this case, alternative instruments seem to be weak with a F-test below 10.

Lastly, we looked into the conjecture that universities or guilds could be used as sole instruments for years of schooling and, consequently, that we should or not look for another additional instruments. Columns (5) and (6) test this conjecture, using presence of religions as additional instruments – in column (5) – and also population density in 1500 – in column (6). In these regressions, In the case of the regression in column (5) not only does the Haussman test indicate that IV is preferable, but also instruments are clearly not weak as indicated by the weak instruments test. This comes in addition of the Sargan test indicating that all instruments may be valid, e.g. exogenous. Furthermore, both main instruments become statistically significant in the first-stage regression. In the regression of the column (6) although consistency of OLS is clearly rejected, the exogeneity of instruments is not rejected but with the addition of population density to the set of instruments, those become weak, as the F-statistic for the first stage regression are now quite lower than 10.

In conclusion, in addition to the evidence presented above about the correlation between the existence of universities and guilds in 1500 and current education level (Figures 2 and 3), Table 2 clearly shows that both instruments are valid for education, yielding a very significant effect of education in GDP differences across the most developed regions in the world. Once the population density variable in 1500 is dropped, the IV estimator becomes higher than the OLS one, indicating that the measurement error problem overcomes the reverse causality and the omitted variables problem in OLS estimation. Regarding a quantitative reading of effects, it may be said that one more year of education in region A, when compared to region B, would imply, on average, nearly 55% more GDP *per capita* in region A than in region B, *ceteris paribus*. Note that this value comes from our validated instrumental variables approaches (columns (3) and (5), Table 2). This indicates a very sizeable quantitative effect, highlighting the importance of human capital for the most developed regions in the world, carrying over from that found in the developing world by Acemoglu *et al.* (2014).

Table 2: Main Results: baseline analysis

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: GDP per capita						
First stage regressions						
Universities	--	0.284***	0.426***	0.488***	0.383***	0.279**
		(0.109)	(0.11)	(0.125)	(0.104)	(0.108)
Guilds	--	0.084	0.122	0.109	0.145*	0.092
		(0.081)	(0.09)	(0.083)	(0.084)	(0.081)
Other exogenous instruments	--	No	No	No	Yes	Yes
Second Stage Regression						
Years of education	0.315***	0.359**	0.538***	0.464***	0.555***	0.815***
	(0.03)	(0.15)	(0.135)	(0.12)	(0.129)	(0.174)
Temperature	-0.043***	-0.043***	-0.042***	-0.041***	-0.046***	-0.041***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.009)	(0.009)
Temperature^2	0.001**	0.001**	0.001***	0.001***	0.002***	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Inv. Distance to coast	-0.494	-0.477	2.316	1.738	1.414	-0.324
	(1.427)	(1.423)	(1.445)	(1.326)	(1.336)	(1.55)
Inv. Distance to coast^2	0.574	0.536	-1.563	-1.083	-1.019	0.15
	(0.904)	(0.905)	(1.086)	(0.984)	(0.94)	(1.038)
Population density in 1500	3.852***	3.605***	--	--	--	--
	(0.509)	(0.971)				
Goodness of fit						
Number of Observations	535	534	1352	1352	951	534
Hausman test p-value	--	0.822	0.062	0.184	0.078	0.000
Sargan Test p-value	--	1.000	0.961	0.743	1.000	1.000
Weak instruments F-Test	--	4.494	10.236	9.310	10.674	5.491
Control function test p-value	--	-0.045	-0.263*	--	--	--
Adjusted R^2	0.88	0.88	0.90	0.91	0.89	0.80

Notes: All regressions include constant and country dummies which coefficients are omitted in the Table. Heteroscedastic consistent standard-errors in parenthesis are in the line below coefficients values. *** indicates statistical significance at 1%, 5% and 10% levels respectively. First column presents OLS regression and columns (2) to (6) present 2SLS regressions

In Table 3, we present robustness results that come from the estimated models. Column (1) presents 2SLS estimates, with clustered standard-errors by country. Robustness to the variance-covariance matrix is tested, meaning that, in this case, standard-errors are clustered by country, increasing the heterogeneity that the model allows for. Column (2) presents GMM regression, generalizing the 2SLS results, changing both the coefficient and variance-covariance matrix. In this case, the value of the objective function at the minimum, suitably scaled by the number of observations, yields *Hansen's J statistic*. This statistic is to be interpreted as a test statistic that has a χ^2 distribution under the null hypothesis of correct specification. The null's validation accepts a good GMM specification. Column (3) presents LIML regression. This method is similar to 2SLS, but estimates by maximum likelihood. In particular, LIML performs better than 2SLS in situations where there are many "weak" instruments (Hahn and Atsushi, 2002), increasing the robustness of the results in light of this potential problem. In our LIML regression, Column (3), both the overidentification and weak instruments test validate the point estimates.

Column (4), (5) and (6) presents SUR, 3SLS and FIML regressions, respectively, which are estimations methods for systems of equations, in our case of two equations. In these specifications, the crucial assumption is that the error terms of each equation are allowed to be correlated with each other. Both 3SLS and FIML estimators correct for endogeneity also in this context. The system can be written as:

$$\begin{cases} y = \alpha + \beta_1 edu + \boldsymbol{X}'\boldsymbol{\beta} \\ edu = \epsilon + \gamma_1 univ1500 + \gamma_2 guild1500 \end{cases}$$

where **X** is the matriz of all covariates, other than education (edu), in the previous equation.

All those results can be compared with those in column (3) in Table 2. In column (1) of the Table 3 results are very similar, revealing that clustering the standard-errors by country doesn't change neither the value of the instruments nor the highly significant effect of education in explaining income disparities. In column (2) GMM point estimates indicate a slightly higher education effect with other effects also significant. J-statistic indicates that the approach is valid, as it is not significantly different from zero.

Column (4) presents the SUR estimates. Point estimates are highly significant, but quantitatively lower than the ones reported so far, mostly in line with the OLS estimates that were presented in Table 2. Moreover, cross-correlations of residuals between both equations is 10%. The Breusch-Pagan test indicates rejection of the null according to which the out-of-the diagonal elements of the variance-covariance matrix are zero (i.e. that the matrix itself is diagonal). The instrumental variables approaches – whose results are in columns (5) and (6) - to the system of two equations setup also present results consistent with the previous ones. The 3SLS regression yields a Hansen-Sargan statistic that accepts the null of correct specification, carrying over the validity of the instrumental variables approach to the specification of the system. Moreover, both BP tests support the system specification. Additionally, the coefficients of Guilds and Universities in 1500 in the equation for years of education are statistically significant, at the 10% level.

Finally it is worth noting the very similar coefficients for the effect of years of education (human capital) we obtained in the instrumental variables approaches in columns (3) and (5) of Table 2 and on columns (1), (2), (3), (4) and (5) of Table 3, which indicates the stability of the effect across different specifications.

Table 3: Robustness

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: GDP per capita						
Equation for years of education in columns (4), (5) and (6)						
Universities in 1500	--	--	--	0.495	0.654*	0.653*
				(0.433)	(0.35)	(0.351)
Guilds in 1500	--	--	--	1.888***	1.792***	1.787***
				(0.241)	(0.231)	(0.228)
Adjusted R^2	--	--	--	0.56	0.56	0.56
Second Stage Regression or Regression for income *per capita*						
Years of education	0.502***	0.503***	0.497***	0.295***	0.502***	0.503***
	(0.093)	(0.044)	(0.034)	(0.008)	(0.044)	(0.044)
Temperature	0.031	0.031***	0.031**	0.012	0.031***	0.031***
	(0.042)	(0.011)	(0.012)	(0.008)	(0.011)	(0.011)
Temperature^2	0.001	0.001*	0.001	-0.000*	0.001*	0.001*
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Inv. Distance to coast	7.328	7.348***	7.282***	4.700***	7.328***	7.348***
	(4.497)	(1.407)	(1.811)	(1.055)	(1.402)	(1.406)
Inv. Distance to coast^2	-4.835	-4.854***	-4.789***	-2.266***	-4.835***	-4.854***
	(2.972)	(1.002)	(1.188)	(0.69)	(0.999)	(1.002)
Goodness of fit						
Number of Observations	1352	1352	1352	1352	1352	1352
Hausman test p-value	0.000	--	--	--	--	--
Sargan test p-value	0.468	--	--	0.000	0.468	--
LR over-identification test	--	0.468	0.864	--	--	--
Weak instruments Test	38.848	38.848	--	--	--	--
J-test p-value	--	--	0.408	--	--	--
BP test p -value	--	--	--	0.004	0.000	0.000
Adjusted R^2	0.63	--	--	0.68	0.63	0.63

Notes: Heteroscedastic consistent standard-errors in parenthesis are in the line below coefficients values. *** indicates statistical significance at 1%, 5% and 10% levels respectively. Column (1) presents 2SLS estimates with clustered standard-errors by country. Column (2) presents two-step GMM regression. Column (3) presents LIML regression. Column (4), (5) and (6) presents SUR, 3SlS and FIML regressions. A constant is included on the models but not shown in the Table.

Conclusions

In this paper we readdress the relationship between human capital and development, which has been a well discussed issue in development economics. However, we approach it in from a different perspective from what has been done so far. First, instead of studying the effect of human capital in the developing world, we do that in developed regions of the world.

Second, we address the exogenous component of human capital as a determinant of development linking human capital to its pre-globalization existing institutions: medieval universities and guilds. Such institutions have been pointed out by economic historians as potential determinants of a changing path of the European development. Notably, when compared with other regions of the globe that, in the pre-Colombian era, were at least as developed as Europe. Inspired by this, we use them as instruments for human capital. We reached not only very robust effects of human capital but also econometric validation of the approach.

In a quantitative reading of effects, it may be said that more one year of education, on average, in region A (Europe), would imply nearly 55% more GDP *per capita* than in region B (developing), *ceteris paribus*. This indicates a very sizeable quantitative effect, highlighting the importance of human capital in the most developed regions in the world. It is also consistent with some of the most recent micro evidence on returns to education in Europe such those in Badescu et al. (2011) and Depalo (2017).[4]

This effect that in our paper is found in developed regions in the world is important to the literature in three main directions. First, human capital seems to be even more crucial for richer regions than for the underdeveloped regions studied by Acemoglu *et al.* (2014). Second, in our case, the instrumental variables approach we used yielded higher coefficients that the OLS approach, which is an opposite relation to that obtained by Acemoglu *et al.* (2014), implying that, in our data, measurement error in human capital (years of schooling) is more relevant than reverse causality and omitted variables as the source of the OLS inconsistency. Third, our results give further support to the use of the presence of medieval universities and guilds as historical instruments for current levels of human capital. This adds to recent and ongoing research that has been focusing on the importance of historically determined conditions, institutions and practices in explaining present-day differences in economic development.

[4] Although these comparisons between macro and micro effects may be made with cautiousness as the first may include long-run externalities.

Looking ahead, there are several prospects for future research. For one, deepening the knowledge about the relationship between pre-Colombian institutions linked to learning, and contemporary measures of human capital. The information about medieval universities and the level of detail about guilds seem promising. In future work, we may also use this database to ascertain the effect of different types of guilds and changing types of universities (e.g. from scholarly to church dominated). This might yield a more exact pattern of the influence of those institutions on the incentives to accumulate human capital, and their consequences in terms of current development.

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