Queen Mary University of London
Humanities & Social Sciences

School of Business and Management
CENTRE FOR GLOBALISATION RESEARCH (CGR)
CGR Working Papers Series
CGR Blog

# Inequality affects long-run growth: Cross-industry, cross-country evidence

CGR Working Paper 102

Roxana Gutiérrez-Romero

**Abstract**

The theoretical literature has predicted that inequality affects long-run growth by reducing human and physical capital, particularly in the presence of imperfect credit markets and other contractual frictions. We test these four mechanisms using measures of inequality at the country-level, dating as far back as the 1700s, and the 1800s, and data for 27 manufacturing industries across 88 countries during 1981–2015. Our findings show industries that are more dependent on financial markets experience lower long-run growth in real output, number of firms and real salaries in more unequal countries compared to more egalitarian. Similarly, industries intensive in physical capital experience lower growth in salaries in highly unequal countries. However, there is no evidence that industries intensive in human capital experience any differential growth in output, the number of firms, average number of employees or salaries in unequal countries compared to more egalitarian, suggesting that the progress made in public schooling provision could have lessened the effect of inequality. Moreover, industries with complex contractual arrangements experience lower growth in the number of firms and paradoxically higher growth in the number of employees hired in more unequal countries, in line with the predictions of the theoretical literature. These findings are robust to using contemporaneous indicators of inequality and instrumental variable specifications.

**Keywords:** Inequality . Growth . Benchmark analysis . Instrumental variables.

**JEL codes:** O11, O47, O50, E22, J24, C36

Version – April 2020

CGR WORKING PAPER SERIES

**Inequality affects long-run growth: Cross-industry, cross-country evidence**

Roxana Gutiérrez-Romero[♦]

This Version: April 2020

**Abstract**

The theoretical literature has predicted that inequality affects long-run growth by reducing human and physical capital, particularly in the presence of imperfect credit markets and other contractual frictions. We test these four mechanisms using measures of inequality at the country-level, dating as far back as the 1700s, and the 1800s, and data for 27 manufacturing industries across 88 countries during 1981–2015. Our findings show industries that are more dependent on financial markets experience lower long-run growth in real output, number of firms and real salaries in more unequal countries compared to more egalitarian. Similarly, industries intensive in physical capital experience lower growth in salaries in highly unequal countries. However, there is no evidence that industries intensive in human capital experience any differential growth in output, the number of firms, average number of employees or salaries in unequal countries compared to more egalitarian, suggesting that the progress made in public schooling provision could have lessened the effect of inequality. Moreover, industries with complex contractual arrangements experience lower growth in the number of firms and paradoxically higher growth in the number of employees hired in more unequal countries, in line with the predictions of the theoretical literature. These findings are robust to using contemporaneous indicators of inequality and instrumental variable specifications.

**Keywords** Inequality . Growth . Benchmark analysis . Instrumental variables.
**JEL codes** O11, O47, O50, E22, J24, C36

---

[♦] Centre for Globalisation Research (GCR) working paper series, School of Business and Management, London, UK. r.gutierrez@qmul.ac.uk. I am grateful to Fabrice Murtin for having shared the historical indicators used here. I also thank Elias Papaioannou, Adam Pepelasis, Costas Repapis, Xavi Ramos, Olga Shemyakina and participants at the Universidad Autónoma de Barcelona for their comments on earlier versions. I acknowledge the financial support from the Spanish Ministry of Science and Innovation (reference ECO2013-46516-C4-1-R) and the Generalitat of Catalunya (reference 2014SGR1279).

## 1 Introduction

Does inequality in the distant past affect long-run growth, and if so, how? While these long-standing questions have been examined by a vast theoretical literature, very contrasting views have been reached thus far. The view that inequality fosters growth is shared by classical economists who argue that inequality may serve as an incentive for people to work harder, save more, and take advantage of profitable investments (Kaldor, 1956; Mirrlees, 1971). Others, however, argue inequality may also affect growth by increasing the risk of conflict (Alesina and Perotti, 1996; Benabou, 1996) and governments implementing inefficient fiscal policies (Persson and Tabellini, 1994). The view that inequality is detrimental to growth is also shared by theoretical models that consider the presence of credit market imperfections and other contractual frictions. According to these models, if some people are prevented from undertaking profitable investments, their consumption will be affected, as well as the bequests they can pass on to their offspring. Thus, the differences in wealth will be sustained across future generations, thereby affecting long-run growth (Banerjee and Newman, 1993; Galor and Zeira, 1993).

Due to the lack of a unified theory explaining how inequality might affect growth, the empirical literature has instead focused on testing whether inequality has an overall positive or negative effect on growth. According to large meta-analyses of the literature, the empirical evidence has been mixed and far from reaching a consensus (Dominicis et al., 2008; Neves et al., 2016). While a few studies have found a positive effect of inequality on growth (Deininger and Olinto, 2000; Forbes, 2000; Li and Zou, 1998), various others have found a negative effect (Banerjee and Duflo, 2003; Berg et al., 2018; Clarke, 1995; Dabla-Norris et al., 2015; Panizza, 2002). The lack of consensus among the vast empirical literature is perhaps unsurprising given the likely endogenous relationship between growth and the contemporaneous inequality measures commonly used. Many previous efforts have ignored such endogeneity issues. Also, empirical studies have used contemporaneous instead of distant past indicators of inequality which does not test the long-run effects predicted in the theoretical literature. Moreover, empirical studies have rarely tested the various mechanisms through which inequality might affect growth.[1] This approach has hindered our understanding of how inequality affects growth, and whether the effects of inequality on economic outcomes are offset or reinforced once the various mechanisms at play are considered simultaneously.[2]

[1] There are a few important exceptions. Some studies have found that inequality affects growth by reducing life expectancy, human capital, increasing fertility (Berg et al. 2018; Deininger and Squire 1998) and leading to inefficient tax policies and political instability (Perotti 1996).

[2] The lack of consensus in the inequality-growth literature also comes from differences in estimation methods, data quality, sample, coverage and the use of different inequality indicators, mostly contemporaneous ones (Neves et al. 2016).

In this paper, we contribute to the empirical literature in three key ways. *First,* we shed new light on *whether* and *how* inequality in the distant past affects economic growth in the long run. Unlike earlier empirical studies, we use historical indicators of income inequality (Gini coefficient) across 88 countries, dating as far back as the 1700s and the 1800s, as well as more contemporaneous measures of inequality. *Second*, although there is an extensive literature testing whether inequality affects Gross Domestic Product (GDP), little attention has been paid to the various other important economic outcomes through which inequality might affect growth. Instead, we analyse whether inequality in the past is associated with the industrial activity that countries experience centuries later. Specifically, we focus on industries long-run growth in real output, number of firms, average number of employees per firm and average real salary per employee. Hence, we provide a broader picture of how inequality, in the distant past, might affect economic activity in the long run. *Third*, we test simultaneously for the key mechanisms mentioned in the theoretical literature linking inequality to long-run growth. According to the literature, initial differences in wealth can over time be transmitted across generations, particularly when people face credit market imperfections and other contractual frictions. In this scenario, some people will be prevented from making profitable investments, thereby affecting growth (Banerjee and Newman, 1993; Blaum, 2013; Gall, 2010; Galor and Zeira, 1993). If these mechanisms are indeed at play, then industries that due to technological differences are more dependent on physical capital, human capital, external finance and contracts, should have lower growth rates in highly unequal countries than in more egalitarian.

To test whether and how inequality might affect growth we use the benchmark method first proposed by Rajan and Zingales (1998) which allows us to test simultaneously for various key mechanisms through which inequality might affect long-run growth.[3] This method uses cross-industry/cross-country regressions, where the long-run growth in output (or number of firms, average number of employees and salaries) is regressed on the interaction between countries' inequality with industries intensity in physical capital, human capital, external finance, and contracts.

We use the most disaggregated and comparable data on growth available for 27 manufacturing industries worldwide, the Industrial Statistics of the United Nations Industrial Development Organization (UNIDO) INDSTAT4. Based on this dataset we estimate the long-run growth in industries' real output, number of firms, the average number of employees hired, and the average salaries over 1981–2015. To determine how intensive industries are in physical capital,

[3] Two studies have recently used this benchmark method to test the effect of inequality. Blaum (2013) for instance, focuses on testing whether inequality reduces the growth of industries intensive in external finance. Erman and Marel te Kaat (2019) ignore the role of external finance and instead test Galor and Moav (2004) theory that inequality might be beneficial for the growth of industries intensive in physical capital but detrimental for those in human capital.

human capital, external finance and contracts we use earlier estimates obtained for large USA industries.[4] Following the benchmark literature, we use these intensities as a proxy, as a benchmark, for the differences in intensities in factors of productions that the same industries face in other countries since the differences in intensities stem from technological demands[5], particularly for large industries, (Beck and Levine, 2002; Ciccone and Papaioannou, 2009; Rajan and Zingales, 1998).

Our analysis focuses exclusively on the 88 countries for which we have Gini coefficients dating back to the 18th and 19th centuries. These inequality indicators are drawn from the income distribution at country-level estimated by Morrisson and Murtin (2011) and Bourguignon and Morrisson (2002). By using historical indicators of inequality, we sidestep potential endogeneity issues and move beyond mere associations between inequality and GDP growth, providing a stronger test of causality. To guard against omitted variable bias, we also control for other determinants of industrial activity such as population's average education, credit available to the private sector and the economic freedom index which measures institutional differences in regulation on credit markets. We also use instrumental variables to take into account that our country-level controls might be endogenous to industrial activity.

Overall, our findings enhance our understanding of the persistently harmful effects that inequality in the distant past has on long-run growth, and the key mechanisms involved. In contrast to some recent empirical studies we find no evidence that industries more intensive in human capital have a differential growth in more unequal countries than in more egalitarian (Erman and Marel te Kaat, 2019). However, we find that inequality disproportionally affects the growth prospects of industries intensive in physical capital, contracts, and in particularly those intensive in external finance, supporting earlier theoretical predictions (Banerjee and Newman, 1993; Blaum, 2013; Gall, 2010; Galor and Zeira, 1993). Our estimates are also of economic importance. For instance, we find that the annual growth differential in real output between an industry at the 75th percentile of external finance (e.g. transport equipment) and an industry at the 25th percentile (e.g. non-metallic mineral products) is 0.25% lower in a country with a Gini coefficient at the 75th percentile (Romania) than in a country at the 25th percentile (Belgium) of the income distribution that prevailed in the 1700s and the 1800s. Similarly, using the same industry-country comparisons, the growth differential per year in real salaries is 0.16% per year lower in a country that was highly unequal in 1820 compared to a more egalitarian one.

[4] We use the industries dependence on physical capital as estimated by Bartelsman and Gray (1996), on human capital by Ciconne and Papaioannou (2009), on external finance by Rajan and Zingales (1998) and on contracts by Nunn (2007).

[5] Technological differences could stem from industries facing different fixed costs, investments, gestational periods of production, and differences in when a firm receives cash flows.

The rest of the paper continues as follows. Section 2 reviews the literature. Section 3 presents our data sources. Section 4 tests the mechanisms through which inequality might affect the growth of industries in the long run. Section 5 presents the robustness checks. Section 6 concludes.

## 2 Related literature

A large strand of the theoretical literature has analysed how inequality affects the accumulation of physical capital and human capital, and how, in turn, these channels might affect long-run growth. Galor and Moav (2004) unify these two channels by posing a model where inequality can be beneficial for growth since inequality might provide an incentive for people to save more and take advantage of profitable investments, just as neoclassical economists have argued (Kaldor, 1956). This beneficial effect of inequality is predicted to be relevant in the initial stages of development where the relative return to physical capital is high and industrial activity is heavily dependent on physical capital accumulation. However, as soon as industrial activity starts relying more on human capital, inequality then is predicted to have an overall negative effect on growth as it hampers human capital accumulation.[6] This detrimental effect on human capital accumulation is similar to the one described in the theoretical work by Galor and Zeira (1993) who suggest that an economy that is initially poor and with higher inequality will be unable to accumulate human capital over time will end up with low output, and with a high wage differential between those who invested in human capital and those who did not.

Although it is plausible that inequality might have contrasting effects on growth, depending on whether one focuses on human or physical capital, there are three important caveats to bear in mind: there is a lack of consensus in the literature on the effect of inequality and there are other important channels to also take into account, the role of financial markets and the role of contractual frictions. First, not all theoretical studies agree that inequality is beneficial for physical capital accumulation and long-run growth. For instance, Banerjee and Newman (1993) show that because of credit market imperfections, the initial wealth distribution determines which occupation people can choose, their returns and bequest they can leave to their children. Over time, if the economy starts with high levels of inequality, where there is a high ratio of workers to those who can afford to become entrepreneurs, the country will converge to a low employment steady state, with few entrepreneurs, low wages and low output.

Second, when examining how inequality might affect growth it is also important to consider the role of financial markets. Industrial activity has become increasingly more dependent on financial

[6] Several studies have found support for inequality being associated with lower levels of human capital accumulation and growth (Easterly 2007; Perotti 1996). There is also evidence that industries that are intensive in human capital grow at slower pace in economies with low levels of human capital in terms of output and employment than those industries not intensive in human capital (Ciconne and Papaioannou 2009).

markets, and much of empirical literature has found that the effect of inequality on growth worsens when borrowing is difficult and costly (Demirguc-Kunt and Levine, 2009). Even in financially developed countries, inequality can dampen growth if wealthier groups benefit disproportionally from financial improvements, as the theoretical work of Blaum (2013) shows. A third caveat to bear in mind when analysing the effect of inequality on growth is that industrial activity has logistically become more complex over time, relying more on a long chain of intermediary suppliers and types of work contracts. The added costs associated with a complex contractual governance can deter the creation of firms and hinder output, particularly in unequal countries where few people can access credit markets. For instance, Gall (2010) in a theoretical model, shows firm owners are driven to employ more agents than technically efficient when facing the threat of contract renegotiation due to weak or imperfect labour contracts. [7] This prediction is in line with Banerjee and Newman (1993) theoretical model which suggest high levels of inequality will result in a few large firms employing a large number of workers on low wages.[8]

In sum, no single theory has provided a unifying view on the various channels by which inequality might affect long-run growth. As a result, the empirical literature has ignored some critical mechanisms and multiple ways in which inequality might affect growth other than output (e.g. salaries and number of firms and average employees per firm). In this paper, we bridge this gap by examining the following three questions:

- Does inequality deter the long-run growth of industries more intensive in physical capital and external finance?
- Does inequality increase the salary premium of industries more intensive in human capital, thereby increasing labour costs and reducing the average size of firms, in terms of the number of employees hired and output produced?

[7] In the model, labour contracts might be renegotiated at any time before the production is finalised. The renegotiation could take place for several reasons, such as workers having the opportunity to hide away output and having weak or imperfect labour contracts.

[8] In this model, Gall (2010) also shows that because of contractual frictions less wealthy entrepreneurs may have no other choice but to have a smaller size firm due to capital constraints. Thus, inequality can generate a heterogeneous distribution of firm sizes, simultaneously generating firms both too large and too small compared to the efficient firm size. Since the dataset that we use comes from the 27 largest manufacturing industries, we are unlikely to find whether inequality yields a potential bimodal distribution of firm sizes (either too small or too large). Nonetheless, our data can reveal if indeed high levels of inequality leads industries (e.g. wealthier entrepreneurs) to employ more workers than same industries in countries with low levels of inequality.

- Does inequality reduce the number of firms and paradoxically increase the number of employees hired in industries that rely more heavily on contracts, due to contractual inefficiencies?

To analyse our research questions, we use benchmark regressions first proposed by Ranjan and Zingales (1998). These authors aimed at testing whether financial development fosters growth, two variables that are likely to feed into each other, hence endogenous. These authors sidestep endogeneity by instead testing whether industries that are more intensive on external finance grow at a faster rate in countries located in countries more financially developed, versus the same industries located in countries less financially developed. This question can be tested by simply regressing the rate of long-run growth of industries across countries on the interaction between countries' financial development and the degree to which industries are dependent on external finance. Since there are no readily available indicators on how intensive each industry is on external finance for each country, Ranjan and Zingales (1998) estimated instead how intensive in external finance each of the large manufacturing industries for the USA is. These estimates were then used as a benchmark of the rankings in external finance intensity that the same industries have in other countries.

Several other authors have used the same benchmark regression approach to test whether differences in factors of production affect long-run growth. These studies have also estimated the differences in intensity in human capital accumulation, contractual frictions, physical capital for large industries in the USA, and used these estimates as a benchmark of the differences in intensities that the same industries have in other countries (Bartelsman and Gray, 1996; Ciconne and Papaioannou, 2009; Nunn, 2007). Other benchmark studies have also tested the effect of inequality. Blaum (2013), for instance, has found support for his theoretical model, which predicts industries that rely more heavily on external finance are smaller in output in countries with higher levels of income inequality. Similarly, Erman and Marel te Kaat (2019) have tested whether inequality increases the growth of value-added of industries that are intensive in physical capital and reduces the rate of growth of those industries that are intensive in human capital, finding supporting Galor and Maov's predictions. Although from these two recent benchmark-regression studies we learn that inequality might have contrasting effects on output, it is unclear whether the effect of inequality will be cancelled out or even change of sign if considering simultaneously all the multiple channels by which inequality might affect growth. We do not yet, whether inequality may have a detrimental effect on other important drivers of long-run growth such as growth in the number of firms, average number of employees per firm and salaries. Furthermore, earlier empirical attempts have used inequality indices that just pre-date the period of analysis (dating at around 1980s or a couple of decades before the period of analysis). In this paper, we go a step forward by testing whether inequality in the long-run, considering inequality in the 1880s has any long-term impact on long-run growth, number of firms, average employees per firm and salaries, as much of the theoretical studies suggest. Since using inequality indicators going as far back as the 1880s may involve introducing a significant measurement error, we also use several other more recent inequality indicators as a robustness test during the period 1820-1980.

## 3 Data

### 3.1. Country-Industry

We use the most disaggregated data on growth available for countries at the industry-level. That is the Industrial Statistics of the United Nations Industrial Development Organization (UNIDO) INDSTAT4 database (revision 3). This INDSTAT4 dataset provides data for 27 manufacturing industries at the three-digit International Standard Classification (ISIC) level on an annual basis over the 1981–2015 period.

In our benchmark specifications, we use four separate industrial indicators as dependent variables. These variables are the industries' growth in real output, number of firms, average number of employees per firm and the average real salary per employee.[9] These variables are available in INDSTAT4 since the 1980s, with only a slight difference in the year in which they are first recorded. For output, the annual series begins in the year 1981, while the rest of the series analysed start instead in the year 1985. Nonetheless, for all these variables, the data continue up to the year 2015. Thus, to measure long-run growth, for each of these four industry-country variables we analyse the annual logarithm compound growth rate over the beginning of the series until 2015.[10]

In line with the benchmark literature, we exclude the USA from our analysis so it is used as a country-industry benchmark. Also, in line with the literature, we exclude countries that have less than ten industries. We also exclude countries that have less than five years of data during the periods 1981–1999 and 2000–2015, in line with the benchmark literature (Rajan and Zingales, 1998). Similarly, we drop Thailand as its data are not comparable from year to year. In total, during this cleaning process, we drop 28 out of the 126 countries available in the UNIDO dataset.[11] We exclude

---

[9] Country-industry specific deflators are not available for most countries in our sample. Hence, following the literature we use the USA produce price index as a deflator for both output and value added (Ciconne and Papaioannou 2009, p. 67). Similarly, we use the USA consumer price index as a deflator for salaries.

[10] In line with previous literature, we calculate the annual compound growth rate as follows: $exp[(1/number\ of\ years\ analysed)*log(Y_{last\ year\ of\ period}/Y_{first\ year\ of\ period})-1]$, where Y is the dependent variable.

[11] The 28 countries deleted in this cleaning process are Afghanistan, Algeria, Bahamas, Bangladesh, Brunei Darussalam, Burundi, Cambodia, Cameroon, Congo, Egypt, Fiji, Gambia, Ghana, Lao People's Dem Republic, Lebanon, Maldives, Macau, Nepal, Niger, Pakistan, Paraguay, Philippines, Rwanda, Saudi Arabia, Thailand, Turkestan, United Arab Emirates and the United States.

another 12 countries as their historical indicators of inequality, explained below, are unavailable, leaving us with a sample of 88 countries and with up to 2,376 observations at the country-industry-level.[12]

Table A.1, in the appendix, shows the annual compound growth rate for each of the four dependent variables analysed over 1981–2015. Over that period, the number of manufacturing firms grew at 3.9% per year. The most unequal region in the world, Latin America, had a slightly lower annual compound growth rate in the number of firms, standing at 3.6%. Other less developed regions, yet more egalitarian, had higher growth in the number of firms such as Africa (3.8%) and Asia (4.0%). Latin America also had a worse growth rate in both real output and real salary than Africa, Asia and Europe.

### 3.2. Industry-Level

To the above mentioned UNIDO dataset, we add information about how intensive each of the 27 industries is in terms of physical capital, human capital, external finance and contracts. In line with the literature, all these intensities refer to USA industries only and taken as a benchmark representation of the differences in intensity in factors that the same industries have in other countries.[13] The literature uses the USA as the preferred benchmark given the detail and quality of statistics available for the country, and because the USA labour and financial markets are in general, less regulated than in other countries. Thus, the observed discrepancies across USA industries' intensities are likely to stem directly from their technological differences (Rajan and Zingales, 1998).

For industries' intensity in physical capital investments, we use the proxy estimated by Bartelsman and Gray (1996). These authors define this intensity as the total real capital stock over total value added in 1980 for USA firms. We also use industries intensity in human capital as estimated by Ciccone and Papaioannou (2009). This intensity measures worker average number of years of schooling at the industry-level in 1980. For industries dependence on external finance, we use the estimates by Rajan and Zingales (1998). These authors measured this intensity as the industry median of the ratio of capital expenditure minus cash flow to capital expenditure for USA firms over 1980–1989. For industries intensity in contracts, we use the proxy estimated by Nunn (2007). He measured this intensity as the cost-weighted proportion of industry's intermediate inputs that are highly differentiated. Nunn (2007) explains that industries with more differentiated inputs require as a

[12] These 12 excluded countries are Albania, Belarus, Cyprus, Czechia, Estonia, Georgia, Latvia, Lithuania, Republic of Moldova, Sudan, Tonga and Ukraine.

[13] The literature does not assume industries in other countries have the same intensity in factors of production as industries in the USA. Instead the assumption being made is that the differences in intensities across USA industries are a good proxy for the differences in intensities that same industries have in other countries.

result, more relationship-specific investments in the production of each final good, hence being more intensive in contracts. Table A.2 shows further details about how these industries' intensities were constructed, and the sources used. The summary statistics of each of the 27 industries' intensities analysed are shown in Table 1. As explained in the robustness section, we also use alternative USA industries' intensities previously estimated by the benchmark literature, which help us confirming the stability of our results.

**Table 1** Industry characteristics

| isicode | isicname | Physical capital intensity [capint] | Alternative physical capital intensity [capintalternative] | External finance [extfin] | Contract intensity [contract] | Alternative contract intensity [contractalt] | School intensity [hcint] | Secondary school intensity [hcintsec] |
|---|---|---|---|---|---|---|---|---|
| 311 | Food products | 1.366 | 0.260 | 0.140 | 0.331 | 0.557 | 11.259 | 0.656 |
| 313 | Beverages | 1.744 | 0.260 | 0.080 | 0.713 | 0.949 | 11.967 | 0.738 |
| 314 | Tobacco | 0.730 | 0.230 | -0.450 | 0.317 | 0.483 | 11.509 | 0.660 |
| 321 | Textiles | 1.807 | 0.250 | 0.190 | 0.376 | 0.820 | 10.397 | 0.510 |
| 322 | Wearing apparel, except footwear | 0.481 | 0.310 | 0.030 | 0.745 | 0.975 | 10.193 | 0.511 |
| 323 | Leather products | 0.663 | 0.210 | -0.140 | 0.571 | 0.848 | 10.138 | 0.507 |
| 324 | Footwear, except rubber or plastic | 0.443 | 0.250 | -0.080 | 0.650 | 0.934 | 10.259 | 0.521 |
| 331 | Wood products, except furniture | 1.632 | 0.260 | 0.280 | 0.516 | 0.670 | 10.787 | 0.593 |
| 332 | Furniture, except metal | 0.789 | 0.250 | 0.240 | 0.568 | 0.910 | 10.760 | 0.583 |
| 341 | Paper and products | 2.215 | 0.240 | 0.170 | 0.348 | 0.885 | 11.693 | 0.727 |
| 342 | Printing and publishing | 0.785 | 0.390 | 0.200 | 0.713 | 0.995 | 12.792 | 0.839 |
| 351 | Industrial chemicals | 2.385 | | 0.250 | 0.240 | | 12.704 | 0.815 |
| 352 | Other chemicals | 0.800 | 0.310 | 0.750 | 0.490 | 0.946 | 13.031 | 0.821 |
| 354 | Misc. petroleum and coal products | 1.199 | 0.230 | 0.330 | 0.395 | 0.895 | 11.921 | 0.691 |
| 355 | Rubber products | 2.265 | 0.280 | 0.230 | 0.407 | 0.923 | 11.730 | 0.743 |
| 356 | Plastic products | 1.416 | 0.440 | 1.140 | 0.408 | 0.985 | 11.678 | 0.715 |
| 361 | Pottery, china, earthenware | 2.316 | 0.200 | -0.150 | 0.329 | 0.946 | 11.244 | 0.650 |
| 362 | Glass and products | 1.954 | 0.280 | 0.530 | 0.557 | 0.967 | 11.484 | 0.691 |
| 369 | Other non-metallic mineral products | 1.746 | 0.210 | 0.060 | 0.377 | 0.963 | 11.655 | 0.678 |
| 371 | Iron and steel | 3.194 | 0.180 | 0.090 | 0.242 | 0.816 | 11.425 | 0.696 |
| 372 | Non-ferrous metals | 2.013 | 0.220 | 0.010 | 0.160 | 0.460 | 11.547 | 0.703 |
| 381 | Fabricated metal products | 1.173 | 0.290 | 0.240 | 0.435 | 0.945 | 11.577 | 0.699 |
| 382 | Machinery, except electrical | 1.017 | 0.290 | 0.600 | 0.764 | 0.975 | 12.266 | 0.789 |
| 383 | Machinery, electric | 0.924 | 0.380 | 0.950 | 0.740 | 0.960 | 12.357 | 0.781 |
| 384 | Transport equipment | 1.320 | 0.310 | 0.360 | 0.859 | 0.985 | 12.346 | 0.780 |
| 385 | Professional & scientific equipment | 0.654 | 0.450 | 0.960 | 0.785 | 0.981 | 12.518 | 0.793 |
| 390 | Other manufactured products | 0.878 | 0.370 | 0.470 | 0.547 | 0.863 | 11.354 | 0.651 |
| | Mean | 1.404 | 0.283 | 0.277 | 0.503 | 0.871 | 11.577 | 0.687 |
| | Standard deviation | 0.700 | 0.071 | 0.363 | 0.191 | 0.154 | 0.795 | 0.098 |
| | Median | 1.320 | 0.260 | 0.230 | 0.490 | 0.939 | 11.577 | 0.696 |
| | 75% percentile | 1.954 | 0.310 | 0.470 | 0.713 | 0.967 | 12.266 | 0.780 |
| | 25% percentile | 0.789 | 0.230 | 0.060 | 0.348 | 0.848 | 11.244 | 0.650 |

Note: Industry-level variables at three-digit ISIC (International Standard Industrial Classification). Capital intensity is a proxy of industry physical capital intensity, as the share of real capital stock to total value added in 1980. Alternative industry physical capital intensity is the median level of capital expenditure for ISIC industries during the 1980's and estimated by Rajan and Zingales (1998) using COMPUSAT. External finance is Rajan and Zingales' (1998) estimates of industry reliance on external finance, defined as 1-industry cash flow over industry investment of large publicly traded US firms in 1980. Contract intensity is Nunn's (2007) estimates of industry contract intensity, as the cost-weighted proportion of differentiated inputs. Alternative intensity of industries in contracts is estimated by Nunn (2007) using U.S. input-output tables in 1996 as the fraction of inputs not sold on exchange. School intensity denotes Ciccone and Papaioannou's (2009) average years of schooling of employees in each industry in the USA in 1980. Secondary school intensity is Ciccone and Papaioannou's (2009) ratio of hours worked by employees with at least secondary school (12 years of schooling) to total hours worked in USA in 1980.

### 3.3. Country-Level

*3.3.1 Historical income distribution*

For each of the 88 countries analysed, we use historical indicators of income inequality, aggregated at the country-level. Specifically, we use the Gini coefficients[14] drawn from the income-distribution estimated at country-level by Bourguignon and Morrisson (2002) for various years during the period 1820–1980.[15] Also, we use the Gini coefficient for the year 1700 derived from the income-distribution at country-level estimated by Morrisson and Murtin (2011). For all the countries analysed here, this Gini coefficient turns to be identical to the Gini coefficient for the year 1820 estimated by Bourguignon and Morrisson (2002).[16] Although it is possible that inequality remained stable during 1700–1820, we cannot ignore that estimating inequality indicators going as far back as 1700 or 1820 may involve introducing a significant measurement error. For that reason, we re-estimate our results using the Gini coefficient for several years. In our main results section, we present our results from using the inequality measures for the year 1820 and 1980, which can reveal important insights into the long-run and short-run effects that inequality might have. In the robustness section, we show the results of using the Gini coefficient for the years 1870, 1929 and 1970.

In Table A.1, we show that on average, across the 88 countries analysed, the Gini coefficient decreased from 0.46 in 1820 to 0.43 in 1980. Nonetheless, as Figure 1 shows countries that were highly unequal in 1820, such as Latin America and South Africa, remained highly unequal by 1980. Conversely, countries that were more egalitarian in 1820 remained more egalitarian in relative terms in 1980, such as in Asia and much of Europe.[17]

---

[14] We use these indicators for income inequality given the wide acceptance of the Gini coefficient as a measure of inequality in the growth-inequality empirical literature and the lack of cross-country data on wealth inequality (Neves et al., 2016).

[15] Bourguignon and Morrisson (2002) estimated the income distribution for 170 countries mostly based on estimators of real GDP and population size by Maddison (1995). For those countries with significant large populations, the income distribution was estimated at country-level. For countries with smaller populations, the income distribution was estimated in sub-groups, according to their similarity in economic evolution and homogeneity.

[16] These Gini coefficients were estimated by Morrisson and Murtin (2011) based on the same method and internal income distributions that Bourguignon and Morrisson (2002) had estimated for the year 1820. This might partly explain the similarity in results.

[17] The inequality observed in 1820 and subsequent periods can partly be explained by historical events. By 1820, most of Africa was still independent, relying on basic agriculture due to scant technology despite its abundant land and with weaker property rights than western protection (OECD, 2006). Nonetheless, what is known today as South Africa was divided into various territories; Cape Town had been colonized by Britain in the early 1800s. Although the flow of migrants contributed to

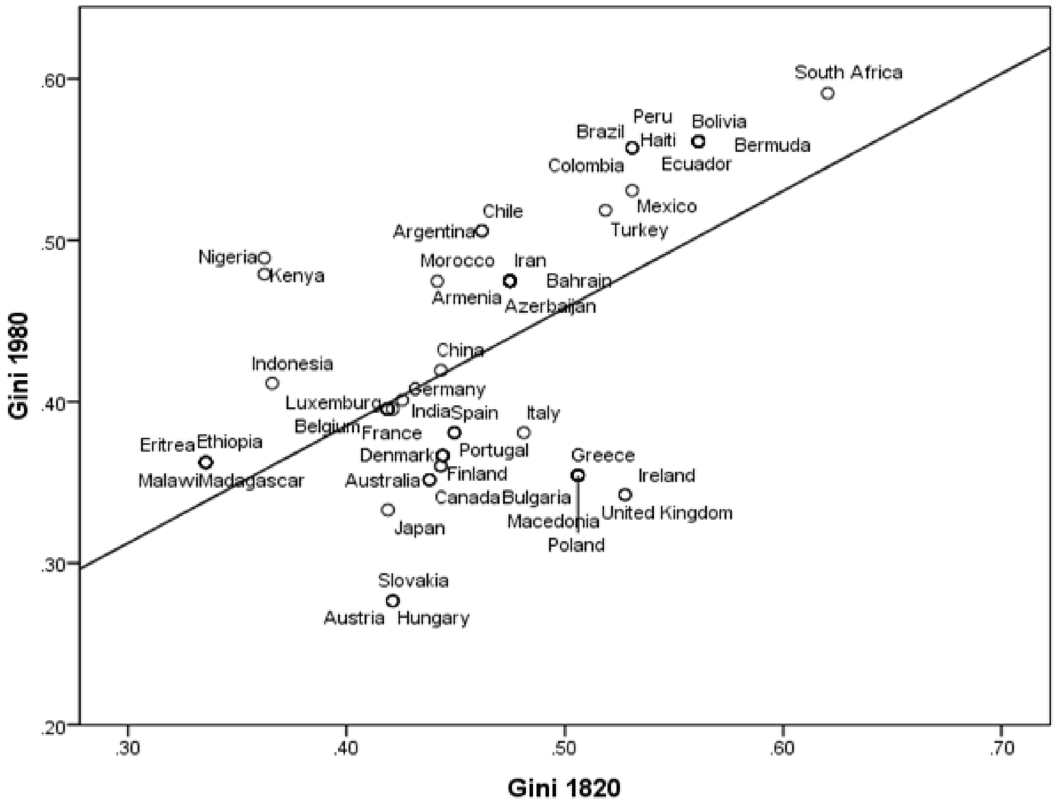


**Fig 1** Gini coefficients for years 1820 and 1980

To better appreciate the association between inequality and long-run growth, Figure 2 shows a scatterplot with the Gini for the year 1820, on the x-axis, and the annual logarithm compound growth rate on real output over the 1981–2015 period, on the y-axis. This scatterplot suggests there is a negative association between inequality and growth. However, since this scatterplot does not control for other factors that could have affected long-run growth, it does not reveal *whether* inequality affected long-run growth and *how* exactly. We investigate these issues in the next section.

---

the accumulation of human capital, the level of inequality was the highest in the continent. In fact, South Africa has the highest level of inequality in our sample in both 1820 and 1980. Around 1820, several Latin American countries became independent, and had high levels of inequality, weak financial markets, tax systems and poor provision of public schooling. By that time, in contrast, Europe had lower levels of inequality and enjoyed more efficient credit markets than other regions, although Asia, on average had the lowest level of inequality.

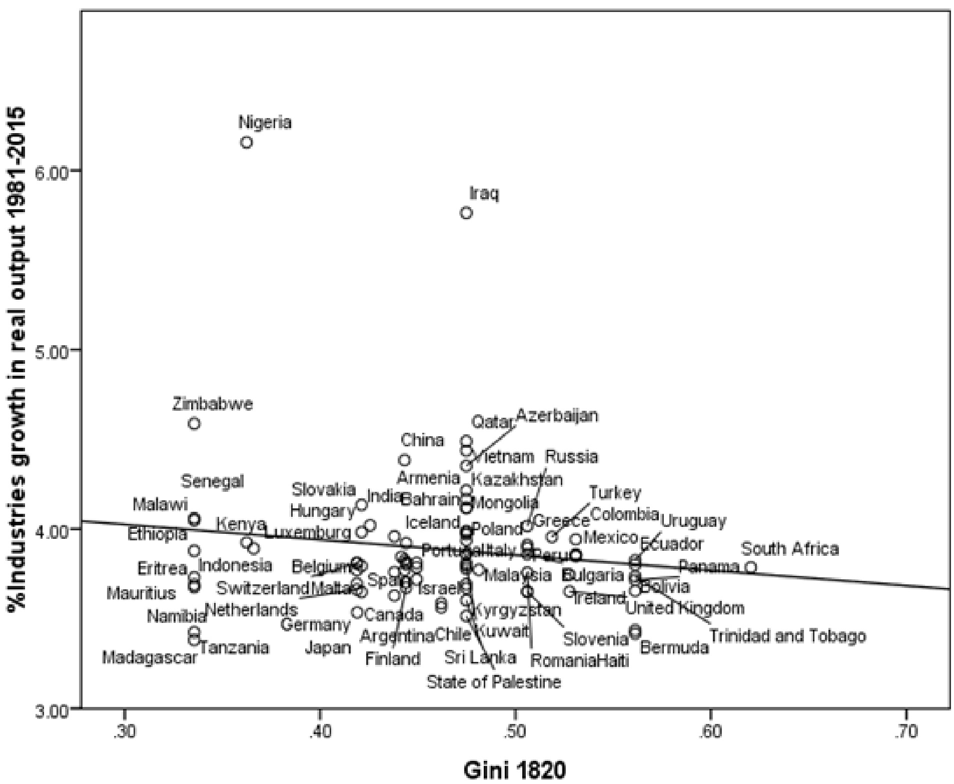


**Fig 2** Industries' annual logarithm compound growth in real output 1981–2015 and the 1820 Gini coefficient

*3.3.2 Economic and institutional setting*

To account for other factors that could have affected long-run growth, we use as controls five contemporaneous indicators of countries' development and institutions. Specifically, we use countries' real per capita Gross Domestic Product (GDP) taken from the Penn World Tables; the population' average number of years of schooling from the Barro and Lee (2013) database; the physical capital stock-GDP ratio taken from Penn World Table, 5.6 and Klenow and Rodriguez-Claire (2005); the domestic credit available to the private sector as a percentage of GDP from the World Bank; and the economic freedom summary index from Gwartney et al. (2017). All these five controls are measured for the year 1980 only. The average statistics at country-level are shown in Table A.1.

We use the economic freedom index because it measures to what extent countries' institutions and policies support economic exchanges, credit and investments, all likely to affect growth. This index comprises 42 data indicators on five key areas.[18] Two of these key areas measure the size of the government and to what extent the legal system protects property rights. Another key area measures sound money, understood as whether inflation preserves real wages and savings. Freedom to trade internationally is the fourth key area, which measures freedom in buying, selling and making

[18] The economic freedom index ranks countries from 0 to a maximum 10.

contracts. And the last key area measures how efficient the government regulation is on credit, labour markets and how businesses operate.

We also control for countries' average number of years of schooling as the important expansion of publicly provided schooling over the past two centuries, and to consider that some countries experienced changes in their distribution of human capital due to migration flows.[19] Thus, it is possible that in contrast to theoretical predictions, inequality in the distant past, might not affect the long-run accumulation of human capital. For instance, Figure 3 shows there is a weak positive correlation between inequality in 1820 and countries' average education in 1980, and with a considerable high spread. In contrast, we find a strong, and negative correlation between inequality in 1820 and the physical capital stock-GDP, and domestic credit available to the private sector, proxies of financial development (Figures 4 and 5).

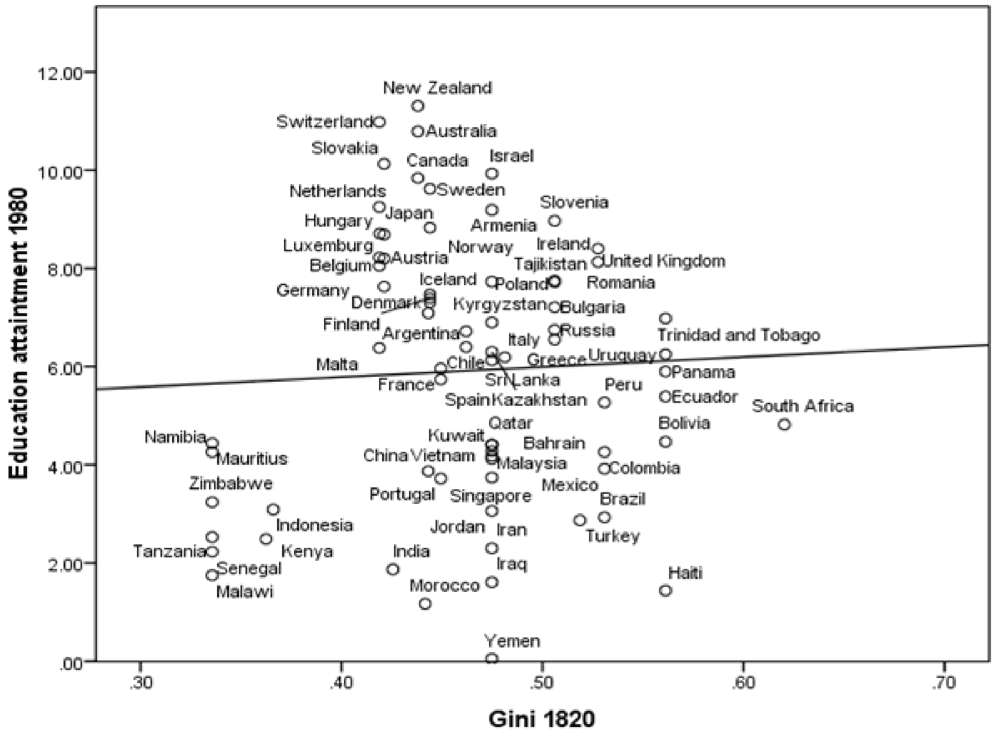


**Fig 3** Average education attainment in 1980 and the Gini coefficients for years 1820

[19] For instance, during the Mass Migration period 1850–1914, about 40 million Europeans migrated to the Americas, mainly the USA, Argentina and Canada, improving substantially the accumulation of human capital in the recipient countries (Droller, 2018).

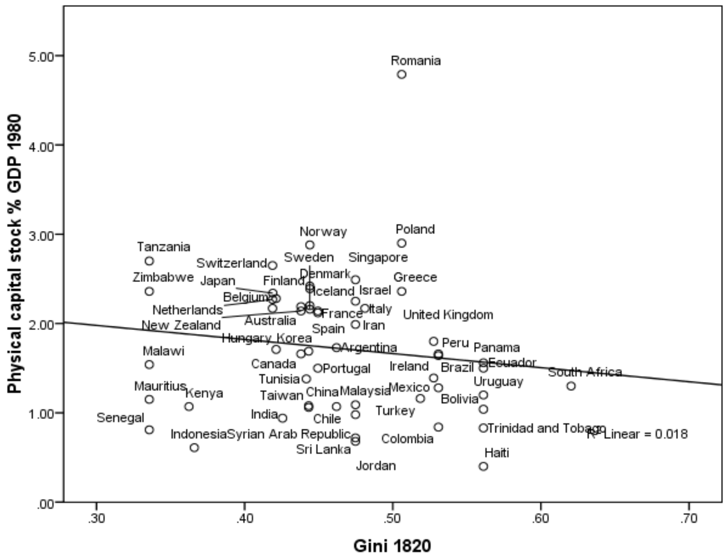


**Fig 4** Physical capital stock-GDP in 1980 and the Gini coefficient for the year 1820

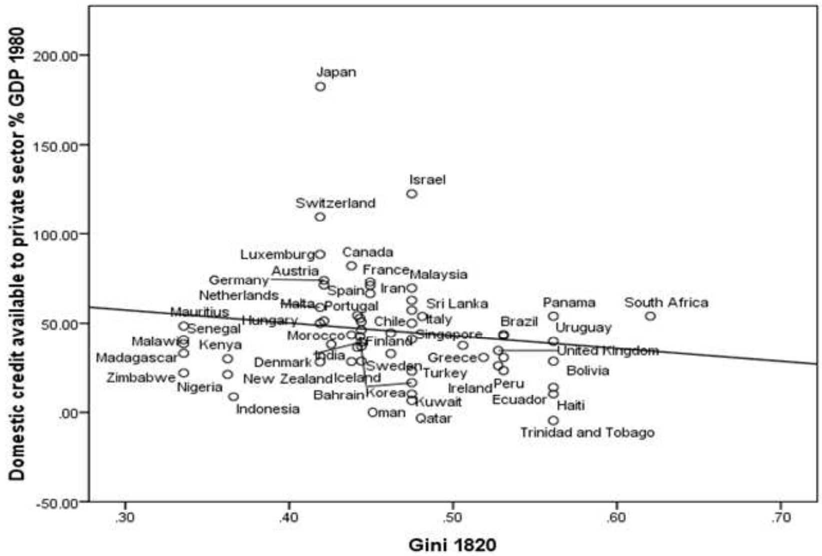


**Fig 5** Domestic credit available to private sector % GDP in 1980 and the Gini coefficient for the year 1820

**4 Inequality and long-run growth**

We test here *whether* and *how* inequality affects long-run growth by examining whether industries that due to technological differences are more dependent on physical capital, human capital, external finance and contracts, have lower growth rates in highly unequal countries than in more egalitarian. To this end, we use a series of OLS cross-industry/cross-country benchmark regressions, as shown in equation (1). We use separately four dependent variables, the long-run growth of industries real output, number of firms, number of employees per firm, and the average real salary per employee. These dependent variables measure the growth that each of the 27 industries in each of the 88 countries analysed had over the 1981–2015 period. To test whether and how inequality might have affected industries long-run growth, we include four interaction coefficients between countries' Gini and industries' dependence on physical capital, human capital, external finance and contracts.

$$\Delta lnY_{i,c,1981\text{-}2015} = \alpha + \beta_1(Gini_c{*}Capital_{ic}) + \beta_2(Gini_c{*}Human\ Capital_{ic}) + \beta_3(Gini_c{*}External\ Finance_{ic}) + \beta_4(Gini_c{*}Contracts_{ic}) + \delta_i + \mu_c + \lambda\mu_c{*}Z_i + \varepsilon_{ic}, \quad (1)$$

where $\Delta lnY_{i,c,1981\text{-}2015}$ measures the annual logarithm compound growth rate over the period 1981–2015 for each of the four dependent variables used in the industry *i* in country *c*. The four interaction coefficients, $\beta$, are the focus of our analysis. These interactions capture whether industries that are more dependent on physical capital, human capital, external finance and contracts experienced lower growth rates in countries that were highly unequal than in more egalitarian ones. By looking at these interactions, instead of direct effects, the number of variables used is reduced, as well as the range of possible alternative explanations (Rajan and Zingales 1998, p. 584).[20] In this regression, we also control for industry, $\delta_i$ and regional, $\mu_c$, fixed effects.[21]

We also run two alternative specifications. In a second specification, we add to the vector $\mu_c$: the real GDP per capita; population' average education; physical capital stock-GDP ratio; credit to the private sector as a percentage of GDP; and the economic freedom index. All these country-level controls are for the year 1980 only, before the period of analysis, to reduce the risk of potential endogeneity issues with the dependent variable. We run a third alternative specification, where following the benchmark literature, we control for other determinants of industries' growth. Specifically, we add the interaction terms between the industry dependency characteristics, denoted by $Z_i$, and the country-level characteristics included in vector $\mu_c$. All these three specifications are estimated with heteroscedasticity robust standard errors, $\varepsilon_{ic}$, clustered at the country-level.[22]

[20] Following the benchmark literature, we only include the interaction coefficients between two main effects, (*Gini*Industry's intensity*), without adding the main effects. This is a valid approach as it is a reparameterization of a fully interacted model including the main interaction effects. Nonetheless, the interpretation differs if the main interaction effects are excluded, as acknowledged and properly interpreted in the benchmark literature, and the same approach is followed here.

[21] The regional fixed effects include Africa, Asia, Western Europe, Latin America, North America, Oceania, Eastern Europe. These fixed effects help capture regional differences stemming from institutional, political or cultural features that also affect long-run growth. This can explain why the effect of inequality on growth is known to be reduced when regional effects are added as controls in growth-inequality regressions (Neves et al., 2016) and in benchmark regressions (Manning, 2003).

[22] As robustness check (not shown but available upon request) we also added the initial level of output (or relevant dependent variable) for each industry at the beginning of the growth series. Our results do

### 4.1 Results

Table 2 shows the four interactions between the Gini for the year 1820, and each of the four industries' intensities analysed. In Table 3, we also present these interactions using the Gini for the year 1980 instead. By using Gini coefficients measured at different points in time, we can learn whether the association between inequality and growth decreases over time. Hence for each of the four mechanisms analysed, we discuss first the interactions with the Gini for 1820, followed by a discussion about the interactions with the Gini for 1980.

**Physical capital.** The interaction between the industries' intensity in physical capital and the Gini for the year 1820 is statistically significant only for the growth of real salaries per employee (Table 2, columns 10-12). This interaction is also negative, suggesting that industries that are more intensive in physical capital experienced slower growth of real salaries in more unequal countries.

The benchmark literature to make economic sense of these results compares growth differentials between industries and countries. As standard, we take the growth differential between an industry at the 75$^{th}$ percentile of physical capital intensity and an industry at the 25$^{th}$ percentile of physical capital intensity, when these industries are located in a country at the 75$^{th}$ percentile of inequality, rather than in a country at the 25$^{th}$ percentile. By this logic, throughout this section, we will compare Romania to Belgium, countries that back in 1820 were in the 75$^{th}$ and 25$^{th}$ of the percentile of inequality. These countries in 1820 had Gini coefficients of 0.51 and 0.35, respectively. Incidentally, the magnitude and differences of these Gini coefficients are of similar magnitude to the differences in Gini that very unequal countries have today (such as much of Latin America) and other more egalitarian regions (such as much of Western Europe).

For the dependent variable of real salary, the interaction coefficient between the Gini for the year 1820 and the industries' intensity in physical capital takes the value of -0.0249 (Table 2, column 11). This interaction, therefore, predicts that the difference in growth rates between the industries in the 75$^{th}$ (glass) and 25$^{th}$ (furniture) percentile of physical capital intensity to be -0.44% per year lower in a highly unequal country, Romania, compared to a more egalitarian one, like Belgium.[23] That is,

---

not change to adding those initial values but we choose not to report these results for two reasons. If indeed inequality affects growth, then these initial values would be endogenously determined. Also, the year of the start of series for each industry and countries varies quite substantially, which adds additional noise to the analysis. For that reason, we chose instead to add as controls the country-level controls which capture the respective variance in levels of development interacted with the respective industries' intensities.

[23] The -0.44% growth differential is obtained as follows: [(-0.0249*1.95*0.5058)-(-0.0249*0.79*0.5058)-(-0.0249*1.95*0.3544)*(-0.0249*0.79*0.3544)]*100. That is, from the growth differential between the 75th and 25th percentile industries intensive in physical capital (with physical capital intensity of 1.95 and 0.79 respectively) in a highly unequal country (Gini=0.5058), is

the real salaries of industries that are more intensive in physical capital grew at a slower rate in more unequal countries than less intensive industries.

If we use the Gini coefficient instead for the year 1980, we find again that the interaction term between inequality and industries' intensity in physical capital is negative and statistically significant (Table 9, columns 11-12). These findings suggest that in line with the theoretical literature, inequality in the long run deters the accumulation of physical capital, thereby likely to affect the growth of worker productivity and their salaries as a result.

In Table 3, we also find instances that inequality in 1980 boosted the growth of the number of employees of industries more intensive in physical capital (columns 7 and 9). This positive and statistically significant interaction suggests that in highly unequal countries, industries more intensive in physical capital, growth at a faster pace in terms of employees, than in less unequal countries. These findings are well in line with the theoretical literature. As, Banerjee and Newman (1993) suggest, in highly unequal countries, it is only the very wealthy the ones who can set up firms, and it is their firms that can grow at a fast pace, in terms of employees. These firms intensive in physical capital will grow at a fast pace, in terms of the number of employees, particularly if the growth in salaries remains at a slow pace, consistent with our findings thus far.

**External financial dependence**. The interaction coefficient between the industries' intensity in external finance and the Gini coefficient for 1820 is negative and statistically significant for real output, the number of employees per firm and real salaries (Table 2, columns 1-3 and 7-9 and 11-12). This negative interaction is also negative and statistically significant if the Gini for 1980 is used instead (Table 3, columns 1-3 and 8-12). Overall, these results support the theoretical predictions that inequality hinders the growth of industries intensive in external finance (Blaum, 2013).

For instance, the difference in growth rates in real output between the industries in the 75$^{th}$ (transport equipment) and 25$^{th}$ (non-metallic mineral products) percentile of external financial dependence is 0.25% per year lower in a country that was highly unequal in 1820 compared to a more egalitarian one.[24] Using the same industry-country comparisons, the growth differential per year in real salaries is 0.16% per year lower in a country that was highly unequal in 1820 compared to a more egalitarian one.

---

subtracted the growth differential for the same industries, but estimated in a country with lower level of inequality (Gini=0.3544).

[24] The -0.25% growth differential is obtained as follows: [(-0.056*0.36*0.5058)-(-0.056*0.060*0.5058)-(-0.056*0.36*0.3544)*(-0.056*0.060*0.3544)]*100.

**Table 2** Industries' growth over 1981–2015 with industries' intensities interacted with the 1820 Gini coefficient

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Real output | | | Number of firms | | | Number of employees per firm | | | Average real salary per employee | |
| Physical capital intensity interaction | -0.1287 | -0.0505 | -0.0503 | 0.0166 | 0.0145 | 0.0058 | 0.0132 | 0.0126 | 0.0229 | -0.0467** | -0.0249* | -0.0260* |
| [1820 Gini x capint] | (0.0859) | (0.0415) | (0.0393) | (0.0394) | (0.0380) | (0.0395) | (0.0157) | (0.0224) | (0.0237) | (0.0216) | (0.0131) | (0.0131) |
| School intensity interaction | 0.0396 | 0.0103 | 0.0101 | 0.0067 | 0.0076 | 0.0080 | -0.0046 | -0.0070 | -0.0076 | 0.0093 | 0.0031 | 0.0031 |
| [1820 Gini x hcint] | (0.0258) | (0.0076) | (0.0070) | (0.0063) | (0.0075) | (0.0077) | (0.0060) | (0.0094) | (0.0092) | (0.0067) | (0.0037) | (0.0037) |
| External finance interaction | -0.0435 | -0.0560* | -0.0470* | -0.0365 | -0.0648 | -0.0620 | -0.0545* | -0.0891** | -0.0779** | 0.0052 | -0.0349** | -0.0345** |
| [1820 Gini x extfin] | (0.0340) | (0.0291) | (0.0254) | (0.0563) | (0.0720) | (0.0724) | (0.0311) | (0.0337) | (0.0341) | (0.0182) | (0.0160) | (0.0168) |
| Contract intensity interaction | -0.5327 | -0.0986 | -0.1015 | -0.1250* | -0.1410 | -0.1298 | 0.1045 | 0.1489 | 0.1295 | -0.0965 | -0.0078 | -0.0059 |
| [1820 Gini x contract] | (0.3825) | (0.0800) | (0.0748) | (0.0637) | (0.0920) | (0.0903) | (0.0835) | (0.1322) | (0.1200) | (0.0809) | (0.0446) | (0.0456) |
| Ln real per capita GDP in 1980 | | -0.0120 | -0.0119 | | 0.0005 | 0.0006 | | 0.0002 | 0.0002 | | -0.0110* | -0.0110* |
| | | (0.0076) | (0.0077) | | (0.0096) | (0.0096) | | (0.0076) | (0.0076) | | (0.0062) | (0.0062) |
| Population average education in 1980 | | -0.0013 | -0.0069 | | -0.0036 | -0.0026 | | 0.0012 | -0.0004 | | 0.0001 | 0.0012 |
| | | (0.0013) | (0.0046) | | (0.0027) | (0.0055) | | (0.0022) | (0.0042) | | (0.0010) | (0.0022) |
| Physical capital 1980 | | 0.0120* | 0.0123* | | 0.0023 | 0.0076 | | -0.0048 | -0.0112 | | 0.0020 | 0.0027 |
| | | (0.0068) | (0.0068) | | (0.0086) | (0.0108) | | (0.0088) | (0.0108) | | (0.0040) | (0.0046) |
| Domestic credit to private sector (% of GDP) in 1980 | | -0.0001 | -0.0001* | | 0.0001 | 0.0001 | | -0.0001 | -0.0001 | | -0.0000 | -0.0000 |
| | | (0.0001) | (0.0001) | | (0.0001) | (0.0001) | | (0.0001) | (0.0001) | | (0.0000) | (0.0000) |
| Economic freedom in 1980 | | -0.0032 | -0.0008 | | -0.0036 | -0.0061* | | 0.0006 | 0.0029 | | -0.0028* | -0.0029 |
| | | (0.0021) | (0.0026) | | (0.0033) | (0.0035) | | (0.0037) | (0.0025) | | (0.0017) | (0.0018) |
| Average education 1980 x School intensity | | | 0.0005 | | | -0.0001 | | | 0.0001 | | | -0.0001 |
| | | | (0.0004) | | | (0.0004) | | | (0.0003) | | | (0.0002) |
| Physical capital 1980 x Physical capital intensity | | | -0.0002 | | | -0.0039 | | | 0.0046** | | | -0.0005 |
| | | | (0.0027) | | | (0.0027) | | | (0.0021) | | | (0.0007) |
| Domestic credit to private sector 1980 x External finance intensity | | | 0.0001 | | | 0.0000 | | | 0.0001 | | | 0.0000 |
| | | | (0.0001) | | | (0.0001) | | | (0.0001) | | | (0.0000) |
| Economic freedom 1980 x Contract intensity | | | -0.0048 | | | 0.0050 | | | -0.0045 | | | 0.0002 |
| | | | (0.0038) | | | (0.0056) | | | (0.0052) | | | (0.0016) |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,927 | 1,202 | 1,202 | 1,946 | 1,185 | 1,185 | 1,695 | 1,031 | 1,031 | 1,725 | 1,081 | 1,081 |
| R-squared | 0.0643 | 0.2064 | 0.2089 | 0.0437 | 0.1751 | 0.1775 | 0.1413 | 0.2515 | 0.2567 | 0.1203 | 0.2880 | 0.2884 |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1980–2015. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

**Table 3** Industries' growth over 1981–2015 with industries' intensities interacted with the 1980 Gini coefficient

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Real output | | | Number of firms | | | Number of employees per firm | | | Average real salary per employee | |
| Physical capital intensity interaction | 0.0354 | -0.0048 | -0.0009 | 0.0524 | 0.0075 | -0.0006 | 0.0364** | 0.0205 | 0.0382*** | -0.0112 | -0.0192** | -0.0229** |
| [1980 Gini x capint] | (0.0376) | (0.0184) | (0.0136) | (0.0553) | (0.0251) | (0.0275) | (0.0142) | (0.0148) | (0.0135) | (0.0100) | (0.0082) | (0.0089) |
| School intensity interaction | 0.0024 | -0.0017 | -0.0007 | 0.0098 | 0.0058 | 0.0070 | -0.0098** | -0.0066 | -0.0087 | 0.0015 | 0.0013 | 0.0017 |
| [1980 Gini x hcint] | (0.0083) | (0.0056) | (0.0051) | (0.0078) | (0.0084) | (0.0084) | (0.0048) | (0.0080) | (0.0075) | (0.0042) | (0.0030) | (0.0031) |
| External finance interaction | -0.0560* | -0.0574*** | -0.0448** | -0.0460 | -0.0520 | -0.0575 | -0.0409 | -0.0690** | -0.0589* | -0.0293*** | -0.0188** | -0.0214** |
| [1980 Gini x extfin] | (0.0293) | (0.0206) | (0.0209) | (0.0525) | (0.0448) | (0.0456) | (0.0272) | (0.0318) | (0.0337) | (0.0108) | (0.0089) | (0.0106) |
| Contract intensity interaction | 0.0436 | -0.0272 | -0.0662 | -0.1925** | -0.2281*** | -0.2320*** | 0.1834** | 0.2484** | 0.2440** | -0.0174 | -0.0375 | -0.0355 |
| [1980 Gini x contract] | (0.1508) | (0.0633) | (0.0574) | (0.0765) | (0.0768) | (0.0764) | (0.0777) | (0.1013) | (0.0955) | (0.0349) | (0.0286) | (0.0319) |
| Ln real per capita GDP in 1980 | | -0.0103 | -0.0103 | | 0.0043 | 0.0043 | | -0.0033 | -0.0033 | | -0.0097 | -0.0097 |
| | | (0.0077) | (0.0078) | | (0.0114) | (0.0115) | | (0.0092) | (0.0092) | | (0.0065) | (0.0066) |
| Population average education in 1980 | | -0.0016 | -0.0053 | | -0.0040 | -0.0014 | | 0.0017 | 0.0016 | | -0.0002 | 0.0018 |
| | | (0.0014) | (0.0047) | | (0.0031) | (0.0056) | | (0.0024) | (0.0043) | | (0.0010) | (0.0023) |
| Physical capital 1980 | | 0.0115* | 0.0100 | | 0.0007 | 0.0040 | | -0.0038 | -0.0110 | | 0.0017 | 0.0033 |
| | | (0.0065) | (0.0065) | | (0.0081) | (0.0104) | | (0.0086) | (0.0109) | | (0.0040) | (0.0047) |
| Domestic credit to private sector (% of GDP) in 1980 | | -0.0001 | -0.0001* | | 0.0001 | 0.0001 | | -0.0000 | -0.0001 | | -0.0000 | -0.0000 |
| | | (0.0001) | (0.0001) | | (0.0001) | (0.0001) | | (0.0001) | (0.0001) | | (0.0001) | (0.0001) |
| Economic freedom in 1980 | | -0.0033 | 0.0001 | | -0.0040 | -0.0033 | | 0.0011 | 0.0014 | | -0.0030* | -0.0029 |
| | | (0.0020) | (0.0026) | | (0.0034) | (0.0033) | | (0.0037) | (0.0027) | | (0.0016) | (0.0017) |
| Average education 1980 x School intensity | | | 0.0003 | | | -0.0002 | | | 0.0000 | | | -0.0002 |
| | | | (0.0004) | | | (0.0004) | | | (0.0003) | | | (0.0002) |
| Physical capital 1980 x Physical capital intensity | | | 0.0011 | | | -0.0024 | | | 0.0051** | | | -0.0012 |
| | | | (0.0028) | | | (0.0029) | | | (0.0022) | | | (0.0008) |
| Domestic credit to private sector 1980 x External finance intensity | | | 0.0001 | | | -0.0000 | | | 0.0001 | | | 0.0000 |
| | | | (0.0001) | | | (0.0001) | | | (0.0001) | | | (0.0000) |
| Economic freedom 1980 x Contract intensity | | | -0.0067* | | | -0.0015 | | | -0.0005 | | | -0.0002 |
| | | | (0.0039) | | | (0.0050) | | | (0.0046) | | | (0.0019) |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,927 | 1,202 | 1,202 | 1,946 | 1,185 | 1,185 | 1,695 | 1,031 | 1,031 | 1,725 | 1,081 | 1,081 |
| R-squared | 0.0632 | 0.2097 | 0.2122 | 0.0484 | 0.1843 | 0.1849 | 0.1446 | 0.2630 | 0.2665 | 0.1186 | 0.2948 | 0.2959 |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1980–2015. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

**Contract intensity.** If we look exclusively at the interaction between the Gini coefficient of 1820 and the industries intensity in contracts, we find scant evidence that inequality affects growth. This interaction coefficient is statistically significant only for the growth in the number of firms, and only for one of the three specifications ran (Table 2, column 4). However, this interaction is more robust if using the Gini coefficient instead for 1980. As Table 3 columns 4-6, show, for the three specifications ran the negative and statistically significant interaction. This finding is in line with the theoretical literature. That is, in more unequal countries, the growth of the number of firms will be affected, particularly in industries facing higher (contractual) costs, where relatively fewer people can set up firms (Gall, 2010).

Again, looking exclusively at the interaction between the Gini coefficient for 1980 and the intensity in contracts, we find a positive and statically significant effect for the number of employees per firm (Table 3, columns 7-9). This interaction implies that the difference in growth rates in the number of employees per firm between the 75$^{th}$ and 25$^{th}$ percentiles of the contract-intensity industry is 1.33% per year higher in a highly unequal country compared to a more egalitarian one. The sign of this interaction is also consistent with the predictions made in the theoretical literature. That is industries that are intensive in contracts, being subject to more contractual frictions, operate at a bigger size, in terms of number employees, in more unequal countries than in more egalitarian (Gall, 2010).

**Human capital.** Except for only one interaction (Table 3, column 7), none of the interaction coefficients between industries' intensity in human capital and the Gini coefficient for the year 1820 or 1980 presented is statistically significant. Therefore, there is no strong evidence that inequality affects growth via the human capital channel. This lack of statistically significant effect might be because the provision of public schooling has had an important contribution in increasing the population's average educational attainment over time, lessening the impact of income inequality.

The expansion of public schooling provision seen worldwide is particularly evident at lower levels of educational attainments, such as primary. Thus, it is perhaps possible that inequality might still have an impact on growth if considering instead higher levels of educational attainment. To examine this possibility, in the robustness section 5.2, we test whether inequality has an impact on growth in industries' intensity in workers with secondary schooling, where we again find that inequality has no impact on growth via the human capital mechanism.

## 5 Further evidence and sensitivity analysis

This section presents five tests that confirm the robustness of our findings. As explained next, these robustness tests rule out of the possibility that our results are driven out by multicollinearity among the interactions considered. These tests also demonstrate that our findings are robust to alternative regression specifications such as using different proxies of industries' intensities, Gini coefficients for different years, and to using instrumental variables. Moreover, we also examine whether inequality affects long-term levels of output (or levels of number of firms, employees and salaries) instead of merely growth rates.

### 5.1 Ruling out multicollinearity

As our first robustness check, we re-estimate our benchmark regression specifications but including only one or two interactions between the Gini coefficient and the industries' intensities at a time. Table 4 and Table 5 show that our findings are robust to these alternative specifications, ruling out multicollinearity as a reason for the findings presented earlier on. Furthermore, in all the 16 columns presented in Tables 4 and 5, we continue to find that the interaction between the Gini coefficient and the intensity in human capital is statistically insignificant. These findings suggest that inequality affects the rate of growth via other mechanisms such as credit and financial market constraints.

### 5.2 Alternative industries' intensities

As a second robustness check, we use alternative measures of industries' intensities in human capital, physical capital and contracts that have been estimated and analysed by previous studies. For instance, as an alternative measure of intensity in human capital, we use the industries intensity in workers with secondary schooling, as estimated by Ciconne and Papaioannou (2009).[25] As an alternative measure of capital intensity, we use the alternative proxy estimated by Rajan and Zingales (1998). These authors measure capital intensity as the ratio of capital expenditures to net property plant and equipment. As an alternative intensity in contracts, we use the fraction of inputs that are neither bought nor sold on an organised exchange, as estimated by Nunn (2007).[26] Table A.2 provides further details about how these alternative intensities were calculated.

Tables 6 and 7 show our results remain robust if we use interact these alternative industries' intensities with the Gini coefficient for 1820 or 1980. That is, these alternative measures of industry intensity suggest that inequality affects industries growth via their intensity on physical capital, external finance or contracts. Once again, the interaction coefficient between the Gini coefficient and the human capital intensity is statistically insignificant in both Tables 6 and 7.

---

[25] This intensity is measured as the ratio of hours worked by employees with at least sixteen years of education to total hours worked in each USA industry in 1980.

[26] Nunn (2007) explains that this alternative contract intensity measures the degree of relationship-specificity, and whether with few alternative buyers and sellers.

**Table 4** Industries' growth over 1981–2015 with industries' intensities interacted with the 1820 Gini coefficient using alternative specifications

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Real output | | | | Number of firms | | | | Number of employees per firm | | | | Average real salary per employee | | | |
| Physical capital intensity interaction | | | | -0.0477 | | | | 0.0083 | | | | 0.0273 | | | | -0.0248* |
| [1820 Gini x capint] | | | | (0.0385) | | | | (0.0418) | | | | (0.0236) | | | | (0.0128) |
| School intensity interaction | -0.0017 | | -0.0016 | 0.0090 | 0.0014 | | 0.0088 | 0.0070 | -0.0011 | | -0.0033 | -0.0094 | -0.0011 | | -0.0029 | 0.0025 |
| [1820 Gini x hcint] | (0.0030) | | (0.0043) | (0.0067) | (0.0056) | | (0.0075) | (0.0080) | (0.0043) | | (0.0061) | (0.0092) | (0.0018) | | (0.0018) | (0.0036) |
| External finance interaction | | -0.0417* | | | | -0.0531 | | | | -0.0851** | | | | -0.0353** | | |
| [1820 Gini x extfin] | | (0.0237) | | | | (0.0708) | | | | (0.0364) | | | | (0.0164) | | |
| Contract intensity interaction | | -0.0078 | -0.0026 | -0.1119 | | 0.0206 | -0.1685 | -0.1496 | | 0.0354 | 0.0495 | 0.1128 | | 0.0053 | 0.0397 | -0.0161 |
| [1820 Gini x contract] | | (0.0531) | (0.0676) | (0.0765) | | (0.1071) | (0.1276) | (0.0913) | | (0.0805) | (0.0877) | (0.1163) | | (0.0360) | (0.0361) | (0.0478) |
| Ln real per capita GDP in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population average education in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector (% of GDP) in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Average education 1980 x School intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 x Physical capital intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector 1980 x External finance intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom 1980 x Contract intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,202 | 1,202 | 1,202 | 1,202 | 1,185 | 1,185 | 1,185 | 1,185 | 1,031 | 1,031 | 1,031 | 1,031 | 1,081 | 1,081 | 1,081 | 1,081 |
| R-squared | 0.2064 | 0.2068 | 0.2064 | 0.2082 | 0.1747 | 0.1750 | 0.1766 | 0.1767 | 0.2543 | 0.2561 | 0.2545 | 0.2551 | 0.2841 | 0.2850 | 0.2848 | 0.2869 |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1981–2015. All models include as control the initial natural logarithm of the dependent variable for the first year of the period analysed. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

**Table 5** Industries' growth over 1981–2015 with industries' intensities interacted with the 1980 Gini coefficient using alternative specifications

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Real output | | | | Number of firms | | | | Number of employees per firm | | | | Average real salary per employee | | | |
| Physical capital intensity interaction | | | | 0.0012 | | | | 0.0018 | | | | 0.0409*** | | | | -0.0222** |
| [1980 Gini x capint] | | | | (0.0133) | | | | (0.0289) | | | | (0.0135) | | | | (0.0088) |
| School intensity interaction | -0.0050 | | -0.0014 | -0.0017 | -0.0046 | | 0.0064 | 0.0060 | 0.0049 | | -0.0013 | -0.0099 | -0.0032 | | -0.0033 | 0.0013 |
| [1980 Gini x hcint] | (0.0037) | | (0.0041) | (0.0050) | (0.0070) | | (0.0075) | (0.0085) | (0.0060) | | (0.0064) | (0.0074) | (0.0020) | | (0.0021) | (0.0030) |
| External finance interaction | | -0.0457** | | | | -0.0517 | | | | -0.0637* | | | | -0.0225** | | |
| [1980 Gini x extfin] | | (0.0202) | | | | (0.0449) | | | | (0.0331) | | | | (0.0102) | | |
| Contract intensity interaction | | -0.0780 | -0.0816 | -0.0793 | | -0.1265 | -0.2549*** | -0.2512*** | | 0.1574 | 0.1416* | 0.2270** | | -0.0357 | 0.0023 | -0.0428 |
| [1980 Gini x contract] | | (0.0596) | (0.0517) | (0.0593) | | (0.1174) | (0.0806) | (0.0741) | | (0.1050) | (0.0769) | (0.0910) | | (0.0330) | (0.0287) | (0.0332) |
| Ln real per capita GDP in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population average education in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector (% of GDP) in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Average education 1980 x School intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 x Physical capital intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector 1980 x External finance intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom 1980 x Contract intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,202 | 1,202 | 1,202 | 1,202 | 1,185 | 1,185 | 1,185 | 1,185 | 1,031 | 1,031 | 1,031 | 1,031 | 1,081 | 1,081 | 1,081 | 1,081 |
| R-squared | 0.2101 | 0.2121 | 0.2111 | 0.2111 | 0.1769 | 0.1831 | 0.1836 | 0.1836 | 0.2586 | 0.2643 | 0.2620 | 0.2644 | 0.2913 | 0.2897 | 0.2913 | 0.2946 |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1981–2015. All models include as control the initial natural logarithm of the dependent variable for the first year of the period analysed. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

**Table 6** Industries' growth over 1981–2015 with alternative industries' intensities interacted with 1820 Gini coefficient

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) | (25) | (26) | (27) | (28) | (29) | (30) | (31) | (32) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Real output | | | | | | | | Number of firms | | | | | | | | Number of employees per firm | | | | | | | | Average real salary per employee | | | | | | | |
| Physical capital intensity interaction | -0.0343 | -0.0340 | -0.0270 | -0.0284 | -0.0335 | -0.0351 | | | 0.0231 | 0.0148 | 0.0398 | 0.0291 | 0.0369 | 0.0260 | | | 0.0060 | 0.0156 | -0.0087 | 0.0015 | -0.0040 | 0.0062 | | | -0.0193 | -0.0203 | -0.0216* | -0.0236** | -0.0244** | -0.0264** | | |
| [1820 Gini x capint] | (0.0361) | (0.0340) | (0.0283) | (0.0273) | (0.0294) | (0.0284) | | | (0.0393) | (0.0405) | (0.0420) | (0.0426) | (0.0430) | (0.0435) | | | (0.0200) | (0.0205) | (0.0180) | (0.0177) | (0.0181) | (0.0183) | | | (0.0137) | (0.0139) | (0.0114) | (0.0114) | (0.0113) | (0.0112) | | |
| Physical capital alternative intensity interaction | | | | | | | 0.7727 | 0.8143 | | | | | | | -0.6297 | -0.5900 | | | | | | | -0.0471 | -0.0817 | | | | | | | 0.1826 | 0.1965 |
| [1820 Gini x capintalternative] | | | | | | | (0.6269) | (0.6220) | | | | | | | (0.5470) | (0.5887) | | | | | | | (0.2730) | (0.2763) | | | | | | | (0.1370) | (0.1399) |
| School intensity interaction | | | | | 0.0051 | 0.0057 | -0.0135 | -0.0137 | | | | | 0.0008 | 0.0027 | 0.0176* | 0.0173 | | | | | -0.0106 | -0.0097 | -0.0106 | -0.0077 | | | | | 0.0045 | 0.0041 | -0.0027 | -0.0036 |
| [1820 Gini x hcint] | | | | | (0.0064) | (0.0057) | (0.0153) | (0.0155) | | | | | (0.0147) | (0.0143) | (0.0100) | (0.0103) | | | | | (0.0113) | (0.0103) | (0.0136) | (0.0123) | | | | | (0.0044) | (0.0042) | (0.0033) | (0.0034) |
| Secondary school intensity interaction | 0.0837 | 0.0812 | -0.0113 | -0.0046 | | | | | 0.0793 | 0.0842 | -0.0263 | -0.0039 | | | | | -0.0795 | -0.0855 | -0.0882 | -0.0768 | | | | | 0.0221 | 0.0220 | 0.0270 | 0.0230 | | | | |
| [1820 Gini x hcintsec] | (0.1029) | (0.0953) | (0.0906) | (0.0845) | | | | | (0.1089) | (0.1101) | (0.1840) | (0.1787) | | | | | (0.1293) | (0.1238) | (0.1338) | (0.1197) | | | | | (0.0590) | (0.0599) | (0.0657) | (0.0654) | | | | |
| External finance interaction | -0.0576* | -0.0477* | -0.0589* | -0.0493* | -0.0591* | -0.0495 | -0.1384* | -0.1314 | -0.0690 | -0.0662 | -0.0700 | -0.0702 | -0.0714 | -0.0698 | -0.0096 | -0.0070 | -0.0851** | -0.0747** | -0.0889** | -0.0814** | -0.0967** | -0.0872** | -0.0898* | -0.0829 | -0.0354* | -0.0344* | -0.0360** | -0.0344* | -0.0329** | -0.0322* | -0.0473** | -0.0466* |
| [1820 Gini x extfin] | (0.0318) | (0.0284) | (0.0321) | (0.0294) | (0.0335) | (0.0301) | (0.0798) | (0.0791) | (0.0694) | (0.0694) | (0.0740) | (0.0750) | (0.0869) | (0.0874) | (0.0624) | (0.0614) | (0.0338) | (0.0349) | (0.0352) | (0.0369) | (0.0375) | (0.0378) | (0.0512) | (0.0512) | (0.0179) | (0.0183) | (0.0175) | (0.0177) | (0.0163) | (0.0172) | (0.0225) | (0.0233) |
| Contract intensity interaction | -0.0307 | -0.0342 | | | | | | | -0.1017 | -0.0887 | | | | | | | 0.1175 | 0.0952 | | | | | | | 0.0153 | 0.0174 | | | | | | |
| [1820 Gini x contract] | (0.0698) | (0.0671) | | | | | | | (0.0881) | (0.0874) | | | | | | | (0.1134) | (0.1018) | | | | | | | (0.0453) | (0.0465) | | | | | | |
| Contract intensity alternative interaction | | | 0.0479 | 0.0410 | -0.0154 | -0.0248 | -0.0478 | -0.0606 | | | 0.0017 | -0.0002 | -0.0234 | -0.0326 | -0.0031 | -0.0127 | | | 0.0996 | 0.0726 | 0.1636 | 0.1335 | 0.1702 | 0.1413 | | | 0.0107 | 0.0165 | -0.0231 | -0.0154 | -0.0200 | -0.0133 |
| [1820 Gini x contractalt] | | | (0.0734) | (0.0727) | (0.0790) | (0.0753) | (0.0726) | (0.0658) | | | (0.1242) | (0.1198) | (0.1667) | (0.1606) | (0.1683) | (0.1635) | | | (0.1015) | (0.0888) | (0.1352) | (0.1173) | (0.1308) | (0.1119) | | | (0.0495) | (0.0497) | (0.0530) | (0.0520) | (0.0517) | (0.0501) |
| Ln real per capita GDP in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population average education in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector (% of GDP) in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Average education 1980 x School intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Physical capital 1980 x Physical capital intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Domestic credit to private sector 1980 x External finance intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Economic freedom 1980 x Contract intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,202 | 1,202 | 1,156 | 1,156 | 1,156 | 1,156 | 1,156 | 1,156 | 1,185 | 1,185 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,031 | 1,031 | 992 | 992 | 992 | 992 | 992 | 992 | 1,081 | 1,081 | 1,039 | 1,039 | 1,039 | 1,039 | 1,039 | 1,039 |
| R-squared | 0.2055 | 0.2077 | 0.2011 | 0.2034 | 0.2013 | 0.2040 | 0.2033 | 0.2062 | 0.1748 | 0.1772 | 0.1773 | 0.1794 | 0.1773 | 0.1794 | 0.1776 | 0.1781 | 0.2513 | 0.2564 | 0.2522 | 0.2570 | 0.2527 | 0.2575 | 0.2527 | 0.2553 | 0.2876 | 0.2879 | 0.2921 | 0.2931 | 0.2927 | 0.2937 | 0.2903 | 0.2911 |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1981–2015. All models include as control the initial natural logarithm of the dependent variable for the first year of the period analysed. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

**Table 7** Industries' growth over 1981–2015 with alternative industries' intensities interacted with 1980 Gini coefficient

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) | (21) | (22) | (23) | (24) | (25) | (26) | (27) | (28) | (29) | (30) | (31) | (32) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Real output | | | | | | | | Number of firms | | | | | | | | Number of employees per firm | | | | | | | | Average real salary per employee | | | | | | | |
| Physical capital intensity interaction | 0.0008 | 0.0057 | 0.0002 | 0.0017 | | | 0.0027 | 0.0035 | 0.0079 | 0.0013 | 0.0396 | 0.0285 | | | 0.0394 | 0.0407 | 0.0180 | 0.0347** | -0.0104 | 0.0061 | | | -0.0133 | -0.0093 | -0.0178** | -0.0205** | -0.0147** | -0.0200** | | | -0.0136* | -0.0143* |
| [1980 Gini x capint] | (0.0170) | (0.0133) | (0.0132) | (0.0112) | | | (0.0129) | (0.0117) | (0.0254) | (0.0283) | (0.0270) | (0.0281) | | | (0.0261) | (0.0277) | (0.0142) | (0.0136) | (0.0135) | (0.0133) | | | (0.0133) | (0.0135) | (0.0083) | (0.0090) | (0.0068) | (0.0075) | | | (0.0069) | (0.0071) |
| Physical capital alternative intensity interaction | | | | | 0.1877 | 0.1980 | | | | | | | -0.5896** | -0.4588* | | | | | | | 0.1524 | 0.0264 | | | | | | | 0.1214 | 0.1373* | | |
| [1980 Gini x capintalternative] | | | | | (0.2799) | (0.2507) | | | | | | | (0.2678) | (0.2644) | | | | | | | (0.2312) | (0.2341) | | | | | | | (0.0804) | (0.0797) | | |
| School intensity interaction | | | -0.0073 | -0.0048 | -0.0104 | -0.0076 | | | | | -0.0059 | -0.0017 | 0.0107 | 0.0105 | | | | | -0.0083 | -0.0092 | -0.0127 | -0.0085 | | | | | 0.0028 | 0.0029 | -0.0018 | -0.0028 | | |
| [1980 Gini x hcint] | | | (0.0060) | (0.0058) | (0.0071) | (0.0072) | | | | | (0.0117) | (0.0109) | (0.0092) | (0.0087) | | | | | (0.0088) | (0.0078) | (0.0105) | (0.0102) | | | | | (0.0029) | (0.0028) | (0.0024) | (0.0024) | | |
| Secondary school intensity interaction | -0.0568 | -0.0459 | | | | | -0.1282 | -0.0897 | 0.0904 | 0.1023 | | | | | -0.0745 | -0.0495 | -0.0911 | -0.1218 | | | | | -0.0751 | -0.0641 | 0.0133 | 0.0142 | | | | | 0.0234 | 0.0110 |
| [1980 Gini x hcintsec] | (0.0801) | (0.0799) | | | | | (0.0770) | (0.0797) | (0.1150) | (0.1169) | | | | | (0.1420) | (0.1399) | (0.1022) | (0.0969) | | | | | (0.1001) | (0.0920) | (0.0421) | (0.0447) | | | | | (0.0381) | (0.0379) |
| External finance interaction | -0.0521** | -0.0424* | 0.0650** | -0.0554** | -0.0877** | -0.0775** | -0.0547** | -0.0498** | -0.0585 | -0.0625 | -0.0653 | -0.0706 | -0.0084 | -0.0249 | -0.0589 | -0.0680 | -0.0629* | -0.0541 | -0.0759** | -0.0726* | -0.0908* | -0.0761 | -0.0694** | -0.0775** | -0.0195* | -0.0209* | -0.0164* | -0.0168 | -0.0264** | -0.0292** | -0.0186* | -0.0159 |
| [1980 Gini x extfin] | (0.0231) | (0.0222) | (0.0236) | (0.0239) | (0.0345) | (0.0327) | (0.0235) | (0.0238) | (0.0442) | (0.0439) | (0.0541) | (0.0568) | (0.0504) | (0.0567) | (0.0476) | (0.0530) | (0.0329) | (0.0346) | (0.0341) | (0.0377) | (0.0450) | (0.0471) | (0.0343) | (0.0353) | (0.0107) | (0.0114) | (0.0094) | (0.0109) | (0.0122) | (0.0132) | (0.0106) | (0.0113) |
| Contract intensity interaction | -0.0101 | -0.0443 | | | | | | | 0.2192** | 0.2177** | | | | | | | 0.2312** | 0.2227** | | | | | | | -0.0309 | -0.0257 | | | | | | |
| [1980 Gini x contract] | (0.0563) | (0.0563) | | | | | | | (0.0786) | (0.0778) | | | | | | | (0.0980) | (0.0947) | | | | | | | (0.0269) | (0.0305) | | | | | | |
| Contract intensity alternative interaction | | | 0.0542 | 0.0157 | 0.0425 | -0.0012 | 0.0518 | 0.0179 | | | -0.0243 | -0.0612 | -0.0094 | -0.0451 | -0.0436 | -0.0649 | | | 0.2196** | 0.2046** | 0.2167** | 0.1973** | 0.1759* | 0.1621* | | | -0.0470 | -0.0403 | -0.0454 | -0.0373 | -0.0313 | -0.0215 |
| [1980 Gini x contract] | | | (0.0547) | (0.0532) | (0.0585) | (0.0554) | (0.0444) | (0.0480) | | | (0.1244) | (0.1176) | (0.1202) | (0.1144) | (0.1022) | (0.1020) | | | (0.1039) | (0.0978) | (0.1008) | (0.0928) | (0.0931) | (0.0912) | | | (0.0307) | (0.0316) | (0.0307) | (0.0310) | (0.0295) | (0.0312) |
| Ln real per capita GDP in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population average education in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector (% of GDP) in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Average education 1980 x School intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Physical capital 1980 x Physical capital intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Domestic credit to private sector 1980 x External finance intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Economic freedom 1980 x Contract intensity | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,202 | 1,202 | 1,156 | 1,156 | 1,156 | 1,156 | 1,156 | 1,156 | 1,185 | 1,185 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,140 | 1,031 | 1,031 | 992 | 992 | 992 | 992 | 992 | 992 | 1,081 | 1,081 | 1,039 | 1,039 | 1,039 | 1,039 | 1,039 | 1,039 |
| R-squared | 0.2099 | 0.2121 | 0.2055 | 0.2070 | 0.2059 | 0.2076 | 0.2059 | 0.2076 | 0.1843 | 0.1847 | 0.1827 | 0.1840 | 0.1826 | 0.1844 | 0.1826 | 0.1834 | 0.2627 | 0.2661 | 0.2613 | 0.2647 | 0.2613 | 0.2645 | 0.2606 | 0.2624 | 0.2947 | 0.2955 | 0.2991 | 0.3003 | 0.2972 | 0.2976 | 0.2987 | 0.2993 |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1981–2015. All models include as control the initial natural logarithm of the dependent variable for the first year of the period analysed. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

### 5.3 Alternative Gini coefficients

As a third robustness check, in Table 8 we re-run our results using the Gini coefficient instead for alternative years (1700, 1870, 1929 or 1970). In this robustness check, we revert to the original regression specification shown in Section 4. That is, we use the same dependent variables (that is the growth rate over 1981–2015) and the same industries' intensities we had originally used to estimate our original specifications.

Earlier, we mentioned that the Gini coefficients for the year 1700 are the same in size to those estimated for the year 1820 for the 88 countries analysed. Thus, using either of these two Gini coefficients yield identical regression coefficients, thus these estimates are not presented. Table 8 (Panels A and B) shows that our results remain remarkably stable in size, sign and statistical significance if using the Gini coefficient instead for other years. The consistency in results when using alternative Gini coefficients is perhaps not surprising. Inequality remained stable from 1700 until 1870. Inequality increased even further by 1929, just ahead of the great depression in some countries, but declined markedly, particularly in Europe by 1970. Thus, the results of using the Gini coefficient of 1820 and 1870 are quite similar, equally the results if using the Gini coefficients for the years 1970 and 1980.

### 5.4 Instrumental variables

Across all our OLS specifications, we have controlled for region, industry fixed effects and country-level characteristics. Our country-level controls are for the year 1980, thus pre-dating our data on industrial growth over 1981–2015. However, we could still face endogeneity. That could be the case, for instance, if the country decided back in 1980 that to boost its future growth it would increase the population's educational attainment, credit to the private sector or improve credit market regulation.

To address this potential endogeneity issue, as our fifth robustness check, we re-run our benchmark specification using instrumental variables. We assume that all our country-level controls are potentially endogenous (the real GDP per capita, population' average education, physical capital stock-GDP ratio, credit to the private sector and the economic freedom index). That is, we have at least five potential endogenous variables if focusing on their main direct effects. But we could have up to nine potential endogenous variables if we also consider the interactions between these country-level controls and the industries' intensities. Given the overall consistency in results between the specifications including only the country-level controls and the interaction with these controls and the industries' intensities, here we only test the endogeneity for the specification that uses the country-level controls only. This simplification significantly reduces the number of relevant instruments needed.

**Table 8** Industries' growth over 1981–2015 with industries' intensities interacted with alternative Gini coefficients for year 1870, 1929 and 1970

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Panel A | | Real output | | | Number of firms | | | Number of employees per firm | | | Average real salary per employee | |
| Physical capital intensity interaction | -0.0503 | -0.0407 | -0.0503 | 0.0058 | 0.0122 | 0.0058 | 0.0229 | 0.0128 | 0.0229 | -0.0260* | -0.0237* | -0.0260* |
| [1870 Gini x capint] | (0.0393) | (0.0351) | (0.0393) | (0.0395) | (0.0383) | (0.0395) | (0.0237) | (0.0240) | (0.0237) | (0.0131) | (0.0125) | (0.0131) |
| School intensity interaction | 0.0101 | 0.0085 | 0.0101 | 0.0080 | 0.0077 | 0.0080 | -0.0076 | -0.0067 | -0.0076 | 0.0031 | 0.0034 | 0.0031 |
| [1870 Gini x hcint] | (0.0070) | (0.0067) | (0.0070) | (0.0077) | (0.0076) | (0.0077) | (0.0092) | (0.0095) | (0.0092) | (0.0037) | (0.0035) | (0.0037) |
| External finance interaction | -0.0470* | -0.0460* | -0.0470* | -0.0620 | -0.0612 | -0.0620 | -0.0779** | -0.0798** | -0.0779** | -0.0345** | -0.0343* | -0.0345** |
| [1870 Gini x extfin] | (0.0254) | (0.0255) | (0.0254) | (0.0724) | (0.0722) | (0.0724) | (0.0341) | (0.0337) | (0.0341) | (0.0168) | (0.0170) | (0.0168) |
| Contract intensity interaction | -0.1015 | -0.1072 | -0.1015 | -0.1298 | -0.1491 | -0.1298 | 0.1295 | 0.1474 | 0.1295 | -0.0059 | -0.0214 | -0.0059 |
| [1870 Gini x contract] | (0.0748) | (0.0789) | (0.0748) | (0.0903) | (0.0917) | (0.0903) | (0.1200) | (0.1210) | (0.1200) | (0.0456) | (0.0504) | (0.0456) |
| Observations | 1,202 | 1,202 | 1,202 | 1,185 | 1,185 | 1,185 | 1,031 | 1,031 | 1,031 | 1,081 | 1,081 | 1,081 |
| R-squared | 0.2089 | 0.2028 | 0.2089 | 0.1775 | 0.1723 | 0.1775 | 0.2567 | 0.2495 | 0.2567 | 0.2884 | 0.2813 | 0.2884 |
| Panel B | | | | | | | | | | | | |
| Physical capital intensity interaction | -0.0605* | -0.0386 | -0.0605* | 0.0023 | 0.0159 | 0.0023 | 0.0411* | 0.0186 | 0.0411* | -0.0310** | -0.0255* | -0.0310** |
| [1929 Gini x capint] | (0.0352) | (0.0299) | (0.0352) | (0.0447) | (0.0433) | (0.0447) | (0.0238) | (0.0292) | (0.0238) | (0.0144) | (0.0131) | (0.0144) |
| School intensity interaction | 0.0138** | 0.0108* | 0.0138** | 0.0157 | 0.0156 | 0.0157 | -0.0177 | -0.0159 | -0.0177 | 0.0043 | 0.0048 | 0.0043 |
| [1929 Gini x hcint] | (0.0062) | (0.0063) | (0.0062) | (0.0098) | (0.0097) | (0.0098) | (0.0109) | (0.0115) | (0.0109) | (0.0034) | (0.0033) | (0.0034) |
| External finance interaction | -0.0744** | -0.0727** | -0.0744** | -0.0979 | -0.0980 | -0.0979 | -0.0772* | -0.0777* | -0.0772* | -0.0404** | -0.0413** | -0.0404** |
| [1929 Gini x extfin] | (0.0291) | (0.0295) | (0.0291) | (0.0779) | (0.0783) | (0.0779) | (0.0420) | (0.0424) | (0.0420) | (0.0186) | (0.0188) | (0.0186) |
| Contract intensity interaction | -0.1520** | -0.1595* | -0.1520** | -0.1660 | -0.2062** | -0.1660 | 0.2045 | 0.2286* | 0.2045 | -0.0398 | -0.0682 | -0.0398 |
| [1929 Gini x contract] | (0.0739) | (0.0833) | (0.0739) | (0.1015) | (0.1004) | (0.1015) | (0.1352) | (0.1338) | (0.1352) | (0.0515) | (0.0565) | (0.0515) |
| Observations | 1,202 | 1,202 | 1,202 | 1,185 | 1,185 | 1,185 | 1,031 | 1,031 | 1,031 | 1,081 | 1,081 | 1,081 |
| R-squared | 0.2100 | 0.2039 | 0.2100 | 0.1823 | 0.1784 | 0.1823 | 0.2623 | 0.2552 | 0.2623 | 0.2908 | 0.2841 | 0.2908 |
| Panel C | | | | | | | | | | | | |
| Physical capital intensity interaction | -0.0037 | 0.0121 | -0.0037 | -0.0013 | 0.0045 | -0.0013 | 0.0411*** | 0.0253 | 0.0411*** | -0.0240** | -0.0198** | -0.0240** |
| [1970 Gini x capint] | (0.0135) | (0.0163) | (0.0135) | (0.0272) | (0.0280) | (0.0272) | (0.0132) | (0.0181) | (0.0132) | (0.0092) | (0.0085) | (0.0092) |
| School intensity interaction | -0.0008 | -0.0030 | -0.0008 | 0.0061 | 0.0066 | 0.0061 | -0.0080 | -0.0065 | -0.0080 | 0.0003 | 0.0008 | 0.0003 |
| [1970 Gini x hcint] | (0.0052) | (0.0059) | (0.0052) | (0.0083) | (0.0086) | (0.0083) | (0.0073) | (0.0079) | (0.0073) | (0.0026) | (0.0026) | (0.0026) |
| External finance interaction | -0.0406* | -0.0386* | -0.0406* | -0.0592 | -0.0596 | -0.0592 | -0.0588* | -0.0595* | -0.0588* | -0.0195* | -0.0198* | -0.0195* |
| [1970 Gini x extfin] | (0.0210) | (0.0211) | (0.0210) | (0.0452) | (0.0455) | (0.0452) | (0.0342) | (0.0347) | (0.0342) | (0.0109) | (0.0111) | (0.0109) |
| Contract intensity interaction | -0.0620 | -0.0657 | -0.0620 | -0.2305*** | -0.2605*** | -0.2305*** | 0.2432** | 0.2580*** | 0.2432** | -0.0334 | -0.0579 | -0.0334 |
| [1970 Gini x contract] | (0.0588) | (0.0653) | (0.0588) | (0.0768) | (0.0756) | (0.0768) | (0.0980) | (0.0942) | (0.0980) | (0.0319) | (0.0356) | (0.0319) |
| Ln real per capita GDP in 1980 | -0.0097 | -0.0082 | -0.0097 | 0.0056 | 0.0057 | 0.0056 | -0.0046 | -0.0062 | -0.0046 | -0.0086 | -0.0085 | -0.0086 |
| | (0.0073) | (0.0071) | (0.0073) | (0.0119) | (0.0120) | (0.0119) | (0.0096) | (0.0098) | (0.0096) | (0.0058) | (0.0054) | (0.0058) |
| Observations | 1,202 | 1,202 | 1,202 | 1,185 | 1,185 | 1,185 | 1,031 | 1,031 | 1,031 | 1,081 | 1,081 | 1,081 |
| R-squared | 0.2127 | 0.2093 | 0.2127 | 0.1868 | 0.1854 | 0.1868 | 0.2696 | 0.2646 | 0.2696 | 0.3083 | 0.3019 | 0.3083 |
| Controls used in all panels | | | | | | | | | | | | |
| Ln real per capita GDP in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population average education in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes |
| Domestic credit to private sector (% of GDP) in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom in 1980 | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes | No | Yes |
| Average education 1980 x School intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 x Physical capital intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector 1980 x External finance intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom 1980 x Contract intensity | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country fixed effects | No | No | No | No | No | No | No | No | No | No | No | No |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Note: The dependent variables in all columns measure the annual logarithm compound growth rate over 1981–2015. All the industry-level intensities used are for the three-digit ISIC (International Standard Industrial Classification) manufacturing industries in the USA, the country used as a benchmark.

Robust standard errors clustered at the country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

We use as external instruments the differences in countries' colonial and legal code origin, populations' average education in 1970, latitude and longitude. We include the colonial origin and the origin of the legal code of each country as exogenous determinants of industrial growth, as former colonisers implemented institutions in their colonies, such as credit market imperfections, which have changed little and continued to affect growth over time (La Porta et al., 1997). Also, countries' colonial origins have been found to be an important historical factor explaining differences in the population's average educational attainment (Bolt and Bezemer, 2009).[27] The lagged value of the population's average education, dating back to 1970, serves as an exogenous determinant of industrial growth, as it helps explain country's average educational attaintment in 1980, and the credit available to the private sector later on. This instrument has also been used in previous related literature, including benchmark studies (Barro, 1996; Ciconne and Papaioannou, 2009). The latitude and longitude instruments help to capture important geographical and historical characteristics across countries.

We present the main second stage of the instrumental variables (IV) regression in Table 9 and Table 10. That is, these tables present the interactions between industries' intensities and the Gini coefficient for the year 1820 and 1980. The bottom of each of these IV tables shows the diagnostic statistics for the instrumental variable estimations. For instance, the Anderson-Rubin Wald tests are large and statistically significant for all cases. These tests therefore suggest there is a strong, and statistically significant correlation between the endogenous variables and the instruments used. The Cragg-Donald F-statistics are also large and above the critical value for a maximum bias of 10%. The respective first-stage regressions are shown in Tables A.3 and A.4.

The IV estimates (in Tables 9 and 10) are remarkably consistent with the OLS results presented earlier (in Tables 2 and 3). This consistency in results between the IV and the OLS estimates is found in terms of the sign, magnitude and statistical significance for all the interactions between the Gini coefficients and the industries' intensities. Given this consistency in estimations, and that we find up to a 10% maximum bias in the IV estimates, there is no evidence that the IV specifications challenge the paper's core findings.

[27] The colonial origin instrument measures whether the country's former coloniser was Spain, Great Britain, France, or whether a Western power never colonised the country. The legal origin measures whether the country's legal code is from the Common law, French, Socialist, German or Scandinavian tradition.

**Table 9** IV estimates of industry's growth over 1981–2015 with industries' intensities interacted with the 1820 Gini coefficient

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Real output | Number of firms | Number of employees per | Average real salary per |
| Physical capital intensity interaction | -0.0499 | 0.0311 | 0.0251 | -0.0323** |
| [1820 Gini x capint] | (0.0456) | (0.0357) | (0.0229) | (0.0142) |
| School intensity interaction | 0.0119 | 0.0061 | -0.0123 | 0.0062 |
| [1820 Gini x hcint] | (0.0086) | (0.0089) | (0.0106) | (0.0041) |
| External finance interaction | -0.0583* | -0.0994 | -0.0804** | -0.0392** |
| [1820 Gini x extfin] | (0.0306) | (0.0667) | (0.0384) | (0.0186) |
| Contract intensity interaction | -0.1122 | -0.1699* | 0.1973 | -0.0354 |
| [1820 Gini x contract] | (0.0888) | (0.0922) | (0.1469) | (0.0460) |
| Ln real per capita GDP in 1980 | -0.0252 | 0.0003 | 0.0068 | -0.0167* |
| | (0.0178) | (0.0220) | (0.0130) | (0.0095) |
| Population average education in 1980 | 0.0004 | -0.0043 | 0.0011 | 0.0007 |
| | (0.0022) | (0.0029) | (0.0020) | (0.0010) |
| Physical capital 1980 | 0.0060 | -0.0095 | -0.0149 | -0.0051 |
| | (0.0149) | (0.0137) | (0.0175) | (0.0072) |
| Domestic credit to private sector (% of GDP) in 1980 | 0.0001 | 0.0005* | -0.0001 | 0.0002 |
| | (0.0001) | (0.0002) | (0.0002) | (0.0001) |
| Economic freedom in 1980 | -0.0039 | -0.0024 | 0.0032 | -0.0032 |
| | (0.0030) | (0.0050) | (0.0033) | (0.0023) |
| Industry fixed effects | Yes | Yes | Yes | Yes |
| Country fixed effects | No | No | No | No |
| Region fixed effects | Yes | Yes | Yes | Yes |
| Observations | 1,140 | 1,122 | 969 | 1,021 |
| R-squared | 0.1679 | 0.1507 | 0.2414 | 0.1958 |
| Cragg-Donald Wald F statistic | 16.300 | 14.130 | 23.900 | 22.280 |
| Anderson-Rubin Wald test | 155.840 | 3.000 | 3.750 | 15.560 |
| Wu-Hausman F test | 6.753 | 7.743 | 16.031 | 11.926 |

Note: Robust standard errors clustered at country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

**Table 10** IV estimates of industries' growth over 1981–2015 with industries' intensities interacted with the 1980 Gini coefficient

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Real output | Number of firms | Number of employees per firm | Average real salary per employee |
| Physical capital intensity interaction | -0.0041 | 0.0086 | 0.0244* | -0.0215** |
| [1980 Gini x capint] | (0.0182) | (0.0244) | (0.0144) | (0.0086) |
| School intensity interaction | -0.0011 | 0.0126 | -0.0068 | 0.0063 |
| [1980 Gini x hcint] | (0.0067) | (0.0114) | (0.0089) | (0.0051) |
| External finance interaction | -0.0547*** | -0.0637 | -0.0675* | -0.0240** |
| [1980 Gini x extfin] | (0.0204) | (0.0441) | (0.0356) | (0.0110) |
| Contract intensity interaction | -0.0347 | -0.2354*** | 0.2666** | -0.0425 |
| [1980 Gini x contract] | (0.0656) | (0.0745) | (0.1040) | (0.0293) |
| Ln real per capita GDP in 1980 | -0.0185 | -0.0085 | 0.0046 | -0.0204* |
| | (0.0214) | (0.0298) | (0.0152) | (0.0108) |
| Population average education in 1980 | -0.0007 | -0.0032 | 0.0020 | 0.0012 |
| | (0.0026) | (0.0038) | (0.0026) | (0.0015) |
| Physical capital 1980 | 0.0055 | -0.0045 | -0.0182 | -0.0030 |
| | (0.0142) | (0.0156) | (0.0189) | (0.0086) |
| Domestic credit to private sector (% of GDP) in 1980 | 0.0001 | 0.0005* | -0.0000 | 0.0002 |
| | (0.0002) | (0.0002) | (0.0003) | (0.0001) |
| Economic freedom in 1980 | -0.0042 | -0.0018 | 0.0024 | -0.0031 |
| | (0.0028) | (0.0053) | (0.0039) | (0.0023) |
| Industry fixed effects | Yes | Yes | Yes | Yes |
| Country fixed effects | No | No | No | No |
| Region fixed effects | Yes | Yes | Yes | Yes |
| Observations | 1,140 | 1,122 | 969 | 1,021 |
| R-squared | 0.1899 | 0.1570 | 0.2502 | 0.1854 |
| Cragg-Donald Wald F statistic | 11.290 | 8.440 | 16.290 | 18.920 |
| Anderson-Rubin Wald test | 4.630 | 7.160 | 2.480 | 4.270 |
| Wu-Hausman F test | 5.527 | 7.315 | 14.428 | 8.419 |

Note: Robust standard errors clustered at country-level shown in parentheses. Significant at the *** p<0.01, ** p<0.05 and * p<0.1 levels.

### 5.5 Differential in growth levels

Thus far, we have focused our analysis exclusively on the long-term growth rate. But it is important to consider that much of the theoretical literature also focuses on the steady-state levels that different countries could achieve. The theoretical predictions do not imply that more egalitarian countries will grow at a higher rate forever. More accurately, these predictions suggest that more egalitarian societies will converge to higher levels of steady state.

As our sixth robustness check, we explicitly test whether and how inequality affects long-term levels of output, number of firms, employees and real salaries. To do so, we split the sample into several five years sub-periods over 1981–2015. Then, in a random-effects model, we use as our dependent variables the average level of output, number of firms, number of employees per firm and real salary in these sub-periods. In this random-effects specification, we add the interactions between the Gini coefficient and the industries' intensities. To this specification, we also add industry, time, regional fixed effects, and country-level controls.

Table 11 shows the results are reasonably consistent if using the interaction between the industries' intensities and the Gini for 1820 (Panel A) or the Gini of 1980 (Panel B). For instance, industries more intensive in external finance have lower levels of output and fewer firms in unequal countries than in more egalitarian countries (Panels A and B, columns 1-4). Similarly, industries more intensive in physical capital have fewer firms in more unequal countries (Panels A and B, columns 3-4). Also, industries more intensive in contracts have fewer firms in more unequal countries, lower salaries (Panels A and B, columns 3-4, column 7). As shown earlier, these industries intensive in contracts also have more employees per firm if using the Gini coefficient for the year 1820 (Panel A, columns 5-6).

Table 11 also shows a few statistically significant interaction coefficients between inequality and industries intensity in human capital. For instance, industries more intensive in human capital have more firms in more unequal than more egalitarian countries. This statistically significant effect holds only if using the Gini coefficient for the year 1820 (Panel A columns 3-4). However, these industries intensive in human capital operate with fewer employees in more unequal countries than in more egalitarian (Panels A and B, columns 5-6). This result might be related to the relatively scarce skilled labour in more unequal countries, such as in much of Latin America and Africa.

**Table 11** Industry activity averaged every five years over 1981–2015 with industries' intensities interacted and the 1820 and 1980 Gini coefficients

| Panel A | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Real Output | | Number of Firms | | Number of employees per firm | | Average real salary per employee | |
| Physical capital intensity interaction | -0.5097 | -0.5034 | -2.6586*** | -2.6291** | 0.1122 | 0.8530 | 0.4141 | 0.1934 |
| [1820 Gini x capint] | (1.4082) | (1.5226) | (0.8822) | (1.1216) | (0.8063) | (0.9628) | (0.3042) | (0.3976) |
| School intensity interaction | 0.5453 | 0.3801 | 1.3337* | 1.2038* | -0.3536 | -0.5082* | 0.0146 | 0.0103 |
| [1820 Gini x hcint] | (0.8453) | (0.8340) | (0.7382) | (0.7273) | (0.2685) | (0.2736) | (0.1887) | (0.1908) |
| External finance interaction | -6.7485*** | -3.6856** | -5.1091** | -3.4283 | -2.3368 | -0.3161 | 0.4187 | 0.5119 |
| [1820 Gini x extfin] | (1.6202) | (1.7961) | (2.1446) | (2.2540) | (1.4945) | (1.9290) | (0.5321) | (0.5273) |
| Contract intensity interaction | -4.3269 | -1.9073 | -13.5434*** | -11.2591** | 8.5067** | 8.9670** | -2.1406* | -1.5852 |
| [1820 Gini x contract] | (3.6416) | (4.1601) | (3.8815) | (4.6094) | (3.3650) | (3.7221) | (1.2620) | (1.1489) |
| Observations | 3,194 | 3,194 | 3,171 | 3,171 | 2,974 | 2,974 | 3,094 | 3,094 |
| Number of country-industries | 740 | 740 | 736 | 736 | 690 | 690 | 720 | 720 |
| Panel B | | | | | | | | |
| Physical capital intensity interaction | 0.2226 | 0.5537 | -1.2003*** | -1.1100** | -0.2414 | 0.1971 | 0.3421* | 0.2739 |
| [1980 Gini x capint] | (0.7457) | (0.9451) | (0.4613) | (0.5203) | (0.5084) | (0.7426) | (0.1970) | (0.2464) |
| School intensity interaction | -0.4307 | -0.5029 | -0.1531 | -0.1974 | -0.3640** | -0.4564** | 0.0419 | 0.0339 |
| [1980 Gini x hcint] | (0.6556) | (0.6649) | (0.7110) | (0.7146) | (0.1791) | (0.1972) | (0.1727) | (0.1781) |
| External finance interaction | -3.1535*** | -1.6378 | -2.7444** | -2.0072* | -1.1154 | -0.3007 | 0.5294 | 0.5129 |
| [1980 Gini x extfin] | (1.1299) | (1.0384) | (1.1493) | (1.1035) | (1.0324) | (1.0462) | (0.3949) | (0.3294) |
| Contract intensity interaction | -5.7546** | -5.2541* | -8.5592*** | -7.7532*** | 2.9735 | 3.6427 | -1.4872* | -1.2657 |
| [1980 Gini x contract] | (2.2835) | (2.7624) | (2.2415) | (2.8024) | (1.9247) | (2.5973) | (0.9034) | (0.8808) |
| Observations | 3,194 | 3,194 | 3,171 | 3,171 | 2,974 | 2,974 | 3,094 | 3,094 |
| Number of country-industries | 740 | 740 | 736 | 736 | 690 | 690 | 720 | 720 |
| Controls used in both Panel A and B | | | | | | | | |
| Ln real per capita GDP in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Population average education in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Physical capital 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Domestic credit to private sector (% of GDP) in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Economic freedom in 1980 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Average education 1980 x School intensity | No | Yes | No | Yes | No | Yes | No | Yes |
| Physical capital 1980 x Physical capital intensity | No | Yes | No | Yes | No | Yes | No | Yes |
| Domestic credit to private sector 1980 x External finance intensity | No | Yes | No | Yes | No | Yes | No | Yes |
| Economic freedom 1980 x Contract intensity | No | Yes | No | Yes | No | Yes | No | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Note: Robust standard errors clustered at country-level shown in parentheses. Significant at the ***p<0.01, ** p<0.05 and * p<0.1 levels.

## 6 Conclusion

This paper analysed empirically *whether* and *how* inequality in the distant past affects long-run growth. To this end, we examined whether past Gini coefficients, dating as far back as the 1700s and the 1800s, affected industries' long-run growth in real output, real value added, number of firms, average number of employees hired and real salaries over the 1981–2015 period. We simultaneously analysed four of the key mechanisms, suggested in the theoretical literature, by which inequality might affect long-run growth. That is, we tested whether industries that due to technological differences are more dependent on physical capital, human capital, external finance and contracts, experienced lower growth rates in highly unequal countries than in more egalitarian ones.

The paper offered four core findings. *First*, long-run growth in output, number of firms and salaries was reduced in industries that are intensive in external finance located in countries that had higher levels of income inequality in the distant past. *Second*, the long-run growth in salaries was also reduced in industries that are intensive in physical capital located in highly unequal countries, suggesting that lower levels of capital (and finance) are associated to lower levels of productivity hence lower salary growth. *Third*, we found no evidence that industries that are intensive in human capital experienced any differential growth in output, firms, number of employees or salaries in unequal compared to more egalitarian countries. These findings contrast with recent literature that has ignored the crucial role of external finance but might be partly explained by the progress made in public schooling provision, which could have lessened the detrimental effect of inequality on the accumulation of human capital. *Fourth*, industries intensive in contracts experienced lower long-run growth in the number of firms, but higher growth in the number of employees hired, potentially due to contractual frictions as the theoretical literature predicts (Gall, 2010).

In sum, our results show that inequality can have a positive or negative effect depending on the outcome and mechanism being studied. But overall, in line with other recent studies, our findings suggest that efforts to accelerate long-run growth require lowering inequality (Berg et al., 2018). These findings are relevant for countries where the more affluent income groups have accumulated wealth over time while the poor have still not benefited particularly considering that the wealth-income ratios in some advanced countries, such as France, Germany and United Kingdom are returning to the high levels seen the 1700s (Stiglitz, 2015). This rise implies that inequality in wealth, and potentially in inherited wealth, will have a more prominent role in the overall structure of inequality, as it did centuries ago (Piketty and Zuckman, 2014). Thus, increases in inequality, as described in this paper, are likely to have a detrimental effect on long-term development, if no significant redistributive measures are implemented.

**References**


Alesina, A., & Perotti, R. (1996). Income distribution, political instability and investment. *European Economic Review, 40*(6), 1203–1228.

Banerjee, A., & Duflo, E. (2003). Inequality and growth: What can the data say? *Journal of Economic Growth*, *8*(3), 267–299.

Banerjee, A., & Newman, A. (1993). Occupational choice and the process of development. *Journal of Political Economy, 101*(2), 274–298.

Barro, R. (1996). *Determinants of economic growth: A cross-country empirical study*. NBER Working Paper 5698.

Barro, R., & Lee J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics, 104*(C), 184–198.

Bartelsman, E. J., & Gray, W. (1996). *The NBER productivity manufacturing database*. NBER Working Paper 205.

Beck, T., & Levine, R. (2002). Industry growth and capital allocation: Does having a market or bank-based system matter? *Journal of Financial Economics*, *64*(2), 147–180.

Benabou, R. (1996). *Inequality and growth*, NBER Working Paper 5658.

Berg, A., Ostry, J. D., Tsangarides, C. G., & Yakhshilikov, Y. (2018). Redistribution, inequality, and growth: new evidence. *Journal of Economic Growth*, *23*(3), 259–305.

Blaum, J. (2013). *Wealth inequality and the losses from financial frictions.* Brown University Working Paper.

Bourguignon, F., & Morrisson, C. (2002). Inequality among world citizens: 1820–1992. *American Economic Review*, *92*(4), 727–744.

Bolt, J., & Bezemer, D. (2009). Understanding long-run African growth: Colonial institutions or colonial education? *Journal of Development Studies, 45*(1), 24-54.

Ciccone, A., & Papaioannou, E. (2009). Human capital, the structure of production, and growth. *Review of Economics and Statistics*, *91*(1), 66–82.

Clarke, G.R.G. (1995). More evidence on income distribution and growth. *Journal of Development Economics*, *47*(2), 403–427.

Dabla-Norris, E., Kochhar, K., Suphaphiphat, N., Ricka, F., & Tsounta, E. (2015). *Causes and consequences of income inequality: A global perspective*. IMF Staff Discussion Note SDN/15/13.

Deininger, K., & Olinto, P. (2000). *Asset distribution, inequality and growth.* World Bank Policy Research Working Paper 2375.

Deininger, K., & Squire, L. (1998). New ways of looking at old issues: inequality and growth. *Journal of Development Economics*, *57*(2), 259–287.

Demirguc-Kunt, A., & Levine, R. (2009). *Finance and inequality: Theory and evidence.* NBER Working Paper 15275.

Dominicis, I., Florax, R., & Groot, H. (2008). A meta-analysis on the relationship between inequality and economic growth. *Scottish Journal of Political Economy*, *55*(5), 654–682.

Droller, F. (2018). Migration, population composition and long run economic development: Evidence from settlements in the Pampas. *The Economic Journal, 128*(614), 2321–2352.

Easterly, W. (2007). Inequality does cause underdevelopment: Insights from a new instrument. *Journal of Development Economics*, *84*(2), 755–776.

Erman, L., te Kaat, D.M. (2019). Inequality and growth: industry-level evidence. *Journal of Economic Growth, 24(3)*: 283–308.

Forbes, K.J. (2000). A reassessment of the relationship between inequality and growth. *American Economic Review, 90*(4), 869–887.

Gall, T. (2010). Inequality, incomplete contracts, and the size distribution of business firms. *International Economic Review, 51*(2), 335–364.

Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *Review of Economic Studies*, *60*(1), 35–52.

Galor, O., & Maov, O. (2004). From physical to human capital accumulation: Inequality and the process of development. *Review of Economic Studies*, *71*(4), 10001–1026.

Gwartney, J., Lawson, R., & Hall, J. (2017). *Economic freedom of the world 2017 annual report.* Fraser Institute.

Kaldor, N. (1956). Alternative theories of distribution. *Review of Economic Studies*, *23*(2), 83–100.

Klenow, P., J., & Rodriguez-Clare, A. (2005) Externalities and growth. In Phillippe Aghion and Steven Durlauf (Eds.) *The Handbook of Economic Growth.* Amsterdam: North-Holland.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. V. (1997). Legal determinants of external finance. *Journal of Finance, 52*(3), 1131–1150.

Li, H., & Zou, H. (1998). Income inequality is not harmful for growth: theory and evidence. *Review of Development Economics*, *2*(3), 318–334.

Maddison, A. (1995). *Monitoring the world economy.* Paris: OECD.

Manning M. J (2003). Finance causes growth: Can we be so sure? *The B.E. Journal of Macroeconomics, De Gruyter*, *3*(1),1–24.

Mirrlees, J. (1971). An exploration in the theory of optimum income taxation. *Review of Economic Studies*, *38*(114), 175–208.

Morrisson, C., & Murtin, F. (2011). *Average income inequality between countries (1700–2030).* FERDI Working Paper P25.

Neves, P.C., Afonso O., & Silva S.T. (2016). A meta-analytic reassessment of the effects of inequality on growth. *World Development, 78*(February), 386–400.

Nunn, N. (2007). Relationship-specificity, incomplete contracts and the pattern of trade. *Quarterly Journal of Economics*, *122*(2), 569–600.

OECD (2006). The impact of western development on the rest of the world, 1000–1950. In *The World Economy: Volume 1: A Millennial Perspective and Volume 2: Historical Statistics*, OECD Publishing, Paris.

Panizza, U. (2002). Income inequality and economic growth: Evidence from American data. *Journal of Economic Growth, 7*(1), 25–41.

Perotti, R. (1996). Growth, income distribution and democracy: what the data say. *Journal of Economic Growth*, *1*(2), 149–187.

Persson, T., & Tabellini, G. (1994). Is inequality harmful for growth? *American Economic Review*, *84*(3), 600–621.

Piketty, T., & Zuckman, G. (2014). Capital is back: wealth-income ratios in rich countries 1700–2010. *Quarterly Journal of Economics*, *129*(3),1255–1310.

Rajan, R. G., & Zingales, L. (1998). Financial dependence and growth. *American Economic Review*, 88(3), 559–586.

Stiglitz, J. (2015). The origins of inequality, and policies to contain it. *National Tax Journal*, *68*(2), 425–448.

United Nations Industrial Development Organization. (2013). *Industrial Statistics*. New York: UNIDO.

# Appendix

## Table A.1 Overall summary statistics

| | All countries | | | | | Africa | | | | | Asia | | | | | Europe | | | | | Latin America | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Countries | Mean | Std. Dev. | Min | Max | Countries | Mean | Std. Dev. | Min | Max | Countries | Mean | Std. Dev. | Min | Max | Countries | Mean | Std. Dev. | Min | Max | Countries | Mean | Std. Dev. | Min | Max |
| Industry's growth in real output 1981-2015 | 83 | 0.39 | 0.04 | 0.34 | 0.62 | 13 | 0.40 | 0.07 | 0.34 | 0.62 | 26 | 0.40 | 0.04 | 0.35 | 0.58 | 28 | 0.38 | 0.01 | 0.36 | 0.41 | 13 | 0.37 | 0.02 | 0.34 | 0.39 |
| Firms' real output at beginning of period in real 100 million US dollars | 83 | 76.32 | 218.50 | 0.07 | 1620.74 | 13 | 7.15 | 14.07 | 0.13 | 46.93 | 26 | 112.67 | 344.28 | 0.13 | 1620.74 | 28 | 97.57 | 168.88 | 1.26 | 807.23 | 13 | 24.44 | 44.13 | 0.07 | 160.24 |
| Industry's growth in number of firms 1985-2015 | 80 | 0.39 | 0.06 | 0.29 | 0.90 | 11 | 0.38 | 0.02 | 0.36 | 0.41 | 26 | 0.40 | 0.11 | 0.29 | 0.90 | 28 | 0.39 | 0.02 | 0.35 | 0.44 | 12 | 0.36 | 0.03 | 0.30 | 0.41 |
| Number of firms at beginning of period | 80 | 1283.38 | 2304.50 | 4.89 | 13675.07 | 11 | 474.95 | 952.76 | 4.89 | 2402.47 | 26 | 1512.21 | 2981.58 | 12.77 | 13675.07 | 28 | 1610.38 | 2308.84 | 36.28 | 10205.81 | 12 | 765.97 | 1606.91 | 7.09 | 4969.44 |
| Industry's growth in average firm size 1985-2015 | 73 | 0.36 | 0.02 | 0.31 | 0.47 | 8 | 0.36 | 0.01 | 0.36 | 0.38 | 24 | 0.37 | 0.02 | 0.33 | 0.42 | 27 | 0.35 | 0.02 | 0.31 | 0.38 | 11 | 0.39 | 0.03 | 0.36 | 0.47 |
| Firms' size at beginning of period | 73 | 156.94 | 219.88 | 5.10 | 1353.30 | 8 | 188.17 | 224.74 | 19.82 | 691.97 | 24 | 224.59 | 280.89 | 5.10 | 1353.30 | 27 | 132.93 | 199.34 | 21.37 | 885.17 | 11 | 72.82 | 61.53 | 5.79 | 241.99 |
| Industry's growth in average salary per employee 1985-2015 | 74 | 0.38 | 0.02 | 0.34 | 0.44 | 10 | 0.37 | 0.01 | 0.35 | 0.39 | 23 | 0.38 | 0.02 | 0.35 | 0.44 | 27 | 0.38 | 0.01 | 0.36 | 0.40 | 11 | 0.37 | 0.01 | 0.34 | 0.39 |
| Average salary at beginning of period | 74 | 7.63 | 7.92 | 0.12 | 28.02 | 10 | 1.78 | 2.02 | 0.12 | 6.50 | 23 | 4.44 | 5.59 | 0.23 | 21.94 | 27 | 12.79 | 8.99 | 0.65 | 28.02 | 11 | 4.53 | 2.86 | 1.64 | 10.98 |
| Gini 1820 | 88 | 0.459 | 0.065 | 0.336 | 0.620 | 15 | 0.37 | 0.08 | 0.34 | 0.62 | 27 | 0.46 | 0.03 | 0.37 | 0.47 | 29 | 0.46 | 0.04 | 0.42 | 0.53 | 14 | 0.54 | 0.04 | 0.46 | 0.56 |
| Gini 1870 | 88 | 0.459 | 0.065 | 0.336 | 0.620 | 15 | 0.37 | 0.08 | 0.34 | 0.62 | 27 | 0.46 | 0.03 | 0.37 | 0.47 | 29 | 0.46 | 0.04 | 0.42 | 0.53 | 14 | 0.54 | 0.04 | 0.46 | 0.56 |
| Gini 1929 | 88 | 0.459 | 0.059 | 0.354 | 0.620 | 15 | 0.40 | 0.07 | 0.36 | 0.62 | 27 | 0.47 | 0.02 | 0.43 | 0.51 | 29 | 0.44 | 0.04 | 0.35 | 0.52 | 14 | 0.54 | 0.04 | 0.46 | 0.56 |
| Gini 1970 | 88 | 0.428 | 0.079 | 0.277 | 0.606 | 15 | 0.41 | 0.08 | 0.36 | 0.61 | 27 | 0.45 | 0.05 | 0.33 | 0.47 | 29 | 0.37 | 0.05 | 0.28 | 0.52 | 14 | 0.54 | 0.04 | 0.46 | 0.56 |
| Gini 1980 | 88 | 0.429 | 0.079 | 0.277 | 0.591 | 15 | 0.41 | 0.07 | 0.36 | 0.59 | 27 | 0.45 | 0.04 | 0.33 | 0.47 | 29 | 0.37 | 0.04 | 0.28 | 0.52 | 14 | 0.55 | 0.02 | 0.51 | 0.56 |
| Real per capita GDP in 1980, US dollars | 72 | 12161.720 | 12087.830 | 664.340 | 80752.420 | 12 | 3287.25 | 2424.75 | 664.34 | 8184.35 | 19 | 13650.63 | 19308.23 | 1044.55 | 80752.42 | 25 | 15920.44 | 7239.26 | 929.52 | 28276.58 | 13 | 9358.51 | 7824.38 | 2381.84 | 33093.42 |
| Population's average education in 1980 | 76 | 5.80 | 2.72 | 0.05 | 11.31 | 11 | 2.84 | 1.1916 | 1.17 | 4.82 | 22 | 4.7927 | 2.6322 | 0.0500 | 9.9300 | 28 | 7.57 | 1.72481 | 2.87 | 10.98 | 12 | 4.99 | 1.66 | 1.44 | 6.98 |
| Physical capital (% of GDP) in 1980 | 56 | 1.722 | 0.764 | 0.400 | 4.790 | 8 | 1.54 | 0.66 | 0.81 | 2.70 | 13 | 1.38 | 0.68 | 0.61 | 2.49 | 20 | 2.27 | 0.74 | 1.16 | 4.79 | 12 | 1.23 | 0.41 | 0.40 | 1.73 |
| Domestic credit to private sector (% of GDP) in 1980 | 61 | 46.023 | 29.363 | -4.567 | 182.574 | 10 | 37.94 | 11.82 | 21.35 | 54.41 | 15 | 52.34 | 46.75 | 6.59 | 182.57 | 21 | 53.69 | 21.92 | 26.22 | 109.54 | 12 | 30.10 | 16.87 | -4.57 | 53.95 |
| Index of economic freedom in 1980 | 63 | 5.414 | 1.255 | 3.440 | 8.050 | 12 | 4.55 | 0.54 | 3.44 | 5.34 | 15 | 5.20 | 1.49 | 3.50 | 7.42 | 21 | 6.11 | 1.09 | 3.59 | 8.05 | 12 | 4.92 | 0.86 | 3.60 | 6.33 |

**Table A.2** Label definitions and list of countries analysed

| Variable | Description |
|---|---|
| | **Country-Industry-Level** |
| Real output | Output in 2015 real USA dollars for each year in industry *s* in country *c* measured in the annual logarithm compound growth rate over 1981–2015. |
| Number of firms | Number of firms for each year in industry *s* in country *c* measured in the annual logarithm compound growth rate over 1985–2015. |
| Number of employees per firm | Average number of employees per firm for each year in industry *s* in country *c* measured in the annual logarithm compound growth rate over 1985–2015. |
| Real salary per employees | Average real salary per employees in industry *s* in country *c* measured in the annual logarithm compound growth rate over 1985–2015. The real salary is estimated using Source for all five country-industry level variables: Own estimates using United Nations Industrial Development Organization (UNIDO) Statistics, 2013. |
| | **USA industry-Level** |
| Physical capital intensity [capint] | Industry physical capital intensity. Defined as total real capital stock over total value added in 1980. Source: Estimated by Bartelsman and Gray (1996) using NBER-CES Manufacturing Industry Database |
| Alternative physical capital intensity [ capintalternative] | Alternative industry physical capital intensity. Defined as the median level of capital expenditure for ISIC industries during the 1980s. Source: Estimated by Rajan and Zingales (1998) using COMPUSAT. |
| School intensity [hcint] | Average years of schooling at the industry level in 1980 based on number of hours worked. Source: Estimated by Ciconne and Papaioannou (2009) using the Integrated Public Use Micro-data series. |
| Alternativ secondary school intensity [hcintsec] | Ratio of hours worked by employees with at lest sixteen years of education to total hours worked in each industry. Estimated by Ciccone and Papaioannou (2009) using the Integrated Public Use Micro-data series. |
| External finance intensity [extfin] | Industry external finance dependence. Defined as the industry-level median of the ratio of capital expenditure minus cash flow to capital expenditure for U.S. firms averaged over 1980-1989. Source: Estimated by Klingebiel et al. (2007) at the three-digit ISIC level using COMPUSAT. |
| Contract intensity [contract] | Industry contract intensity. Source: Estimated by Nunn (2007) using U.S. input-output tables in 1996 as the cost-weighted proportion of industry's intermediate inputs used that are highly differentiated, hence that can be expected to require relationship-specific investments in the production of each final good |
| Alternative contract intensity [contractalt] | Alternative intensity of industries in contracts. Source: Estimated by Nunn (2007) using U.S. input-output tables in 1996 as the fraction of inputs not sold on exchange. |
| | **Alternative mesures for UK industry intensities** |
| Physical capital intensity [ukcapint] | The ratio of real fixed capital stock over the value added for year 1997. Source: EUKLEMS database. Timmer, O'Mahony and van Ark (2007). |
| School intensity [ukhcint] | The ratio of the number of hours worked by low-skilled people over the total hours worked in total for year 1997. Source: EUKLEMS database. Timmer, O'Mahony and van Ark (2007). |
| External finance intensity [ukextfin] | The ratio of real fixed capital stock over the value added. Source: EUKLEMS database. Timmer, O'Mahony and van Ark (2007). |
| | **Country-Level** |
| Gini | Gini coefficient for the years of 1700, 1820, 1870, 1929, 1970 and 1980. Source: Own estimates using the decile's income share using the estimates by Bourguignon and Morrisson (2002) and Morrisson and Murtin (2011) |
| Real per capita GDP in 1980, US dollars | Real per capita Gross Domestic Product (GDP). Source: Penn World Tables |
| Population's average education in 1980 | Average years of total schooling of population age 15+. Source: Barro and Lee (2013) |
| Domestic credit to private sector (% of GDP) in 1980 | Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity. Source: World Bank |
| Index of economic freedom in 1980 | The economic freedom index measures to what extent countries' institutions and policies support economic exchanges and investments, ranking countries from 0 to a maximum 10. The index comprises 42 data indicators across five key areas. Area 1: Size of Government—As spending and taxation by government, size of government-controlled enterprises. Area 2: Legal System and Property Rights. Area 3: Sound Money—Inflation. Area 4: Freedom to Trade Internationally. Freedom in buying, selling and making contracts. Area 5: Regulation—Efficiency in regulations for right to exchange, gain credit, hire or work and freely operate businesses. Source: Gwartney et al. (2017). |
| Countries analysed | In Africa: Botswana, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Morocco, Namibia, Nigeria, Senegal, South Africa, Tanzania, Tunisia and Zimbabwe. In Asia: Armenia, Azerbaijan, Bahrain, China, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Kazakhstan, Korea, Kuwait, Kyrgyztan, Malasia, Mongolia, Oman, Qatar, Singapore, Sri Lanka, State of Palestine, Syrian Arab Republic, Taiwan, Tajikistan, Vietnam and Yemen. In Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom. In Latin America: Argentina, Aruba, Bermuda, Bolivia, Brazil, Chile, Colombia, Ecuador, Haiti, Mexico, Panama, Peru, Trinidad and Tobago and Uruguay. In North America: Canada. In Oceania: Australia and New Zealand. In Eastern Europe: Bulgaria, Croatia, Macedonia, Poland, Romania, Russia, Slovakia, Slovenia and Turkey. |

**Table A.3** First stage IV regression of results shown in Table 9

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | Real output | | |
| | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 |
| Physical capital intensity interaction | -0.0569 | -0.0961 | -0.161 | 2.797 | 0.126 |
| [1820 Gini x capint] | (-0.59) | (-0.68) | (-1.59) | (-0.83) | (-0.71) |
| School intensity interaction | 0.106 | -0.0744 | -0.129 | -0.466 | 0.144 |
| [1820 Gini x hcint] | (-1.26) | (-0.96) | (-1.22) | (-0.10) | (-0.86) |
| External finance interaction | 0.0741 | 0.00616 | -0.0248 | 2.391 | -0.549 |
| [1820 Gini x extfin] | (-0.40) | (-0.04) | (-0.14) | (-0.28) | (-1.62) |
| Contract intensity interaction | 0.417 | -0.298 | -0.837* | -3.89 | 0.455 |
| [1820 Gini x contract] | (-1.35) | (-0.75) | (-2.56) | (-0.24) | (-0.86) |
| Legal origin (Common law reference group) | | | | | |
| French legal origin | 0.437 | -0.114 | 0.276 | 28.16* | 0.587 |
| | (-1.77) | (-0.64) | (-1.47) | (-2.30) | (-1.77) |
| Socialist legal origin | -0.626** | -0.264 | -0.487* | 8.94 | -2.597*** |
| | (-2.87) | (-1.53) | (-2.51) | (-0.93) | (-9.54) |
| German legal origin | -0.15 | -0.228 | -0.116 | 38.52* | 0.229 |
| | (-0.41) | (-0.91) | (-0.40) | (-2.24) | (-0.54) |
| Scandinavian legal origin | 0.279 | 0.21 | 0.462* | 6.021 | -0.667 |
| | (-1.18) | (-0.73) | (-2.23) | (-0.63) | (-1.72) |
| Was not a colony | 0.712 | 0.620* | 1.717*** | 80.74*** | -0.746 |
| | (-1.82) | (-2.25) | (-5.37) | (-3.78) | (-1.46) |
| Population average education in 1970 | 0.245*** | 0.981*** | 0.106** | 6.691 | 0.234** |
| | (-3.99) | (-29.04) | (-2.90) | (-1.93) | (-3.19) |
| Former Spanish colony | -0.444** | 1.248*** | -0.410** | -18.15** | 1.191*** |
| | (-3.16) | (-9.42) | (-3.08) | (-3.11) | (-3.91) |
| Former British colony | 0.723 | -0.0936 | 1.069** | 60.99*** | 1.596** |
| | (-1.83) | (-0.32) | (-3.11) | (-4.04) | (-3.02) |
| Former French colony | -0.0212 | -0.893 | 0.13 | 42.74* | 1.736* |
| | (-0.04) | (-1.93) | (-0.21) | (-2.25) | (-2.10) |
| Latitude | 0.00115 | 0.00471 | -0.00413 | 0.0315 | 0.0254** |
| | (-0.18) | (-1.16) | (-0.80) | (-0.09) | (-2.72) |
| Longitude | 0.0015 | 0.000937 | 0.00295 | 0.0457 | 0.0267*** |
| | (-0.32) | (-0.26) | (-0.84) | (-0.15) | (-3.65) |
| N | 1140 | 1140 | 1140 | 1140 | 1140 |
| F-excluded | 11.370 | 297.210 | 11.400 | 18.560 | 33.540 |

| | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|
| | | | Number of firms | | |
| | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 |
| Physical capital intensity interaction | -0.119 | -0.155 | -0.17 | 1.67 | 0.077 |
| [1820 Gini x capint] | (-1.00) | (-1.00) | (-1.47) | (-0.65) | (-0.9) |
| School intensity interaction | 0.226** | -0.0241 | -0.13 | 2.143 | 0.151 |
| [1820 Gini x hcint] | (-2.76) | (-0.32) | (-1.20) | (-0.60) | (-0.99) |
| External finance interaction | -0.145 | 0.0688 | 0.238 | -3.918 | -0.352* |
| [1820 Gini x extfin] | (-1.56) | (-0.77) | (-1.79) | (-0.93) | (-2.24) |
| Contract intensity interaction | 0.104 | -0.424 | -0.714* | -10.31 | -0.238 |
| [1820 Gini x contract] | (-0.30) | (-1.07) | (-2.37) | (-1.15) | (-0.67) |
| Legal origin (Common law reference group) | | | | | |
| French legal origin | 0.377 | -0.141 | 0.23 | 27.68* | 0.47 |
| | (-1.56) | (-0.76) | (-1.27) | (-2.40) | (-1.39) |
| Socialist legal origin | -0.119 | 0.0157 | -0.0796 | 20.69 | -2.199*** |
| | (-0.27) | (-0.06) | (-0.20) | (-1.90) | (-4.73) |
| German legal origin | -0.189 | -0.375 | -0.356 | 34.02 | -0.0693 |
| | (-0.39) | (-1.59) | (-0.83) | (-1.87) | (-0.16) |
| Scandinavian legal origin | 0.245 | 0.175 | 0.414* | 7.651 | -0.827* |
| | (-1.03) | (-0.62) | (-2.00) | (-0.86) | (-2.14) |
| Was not a colony | 0.503 | 0.701* | 1.810*** | 85.39*** | -0.825 |
| | (-1.19) | (-2.12) | (-4.82) | (-4.04) | (-1.54) |
| Population average education in 1970 | 0.211*** | 0.961*** | 0.0748* | 5.908 | 0.188* |
| | (-3.43) | (-25.2) | (-2.02) | (-1.79) | (-2.56) |
| Former Spanish colony | -0.507** | 1.295*** | -0.347 | -15.28** | 1.045** |
| | (-3.09) | (-7.69) | (-1.96) | (-2.64) | (-3.05) |
| Former British colony | 0.563 | -0.102 | 1.097** | 60.91*** | 1.493** |
| | (-1.38) | (-0.32) | (-3.08) | (-4.24) | (-2.71) |
| Former French colony | 0.204 | -0.497 | 0.358 | 60.64** | 1.717 |
| | (-0.25) | (-0.85) | (-0.46) | (-2.89) | (-1.59) |
| Latitude | 0.00751 | 0.00557 | 0.000529 | -0.0158 | 0.0349** |
| | (-0.97) | (-0.95) | (-0.08) | (-0.04) | (-2.63) |
| Longitude | 0.00316 | 0.0025 | 0.00636 | 0.0865 | 0.0284*** |
| | (-0.64) | (-0.63) | (-1.59) | (-0.30) | (-3.85) |
| N | 1122 | 1122 | 1122 | 1122 | 1122 |
| F-excluded | 4.080 | 166.040 | 9.410 | 11.390 | 11.500 |

| | (11) | (12) | (13) | (14) | (15) |
|---|---|---|---|---|---|
| | | | Number of employees per firm | | |
| | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 |
| Physical capital intensity interaction | -0.205 | -0.0683 | -0.198 | -6.395 | -0.102 |
| [1820 Gini x capint] | (-1.29) | (-0.37) | (-1.25) | (-1.06) | (-0.60) |
| School intensity interaction | 0.0586 | -0.0255 | 0.0419 | -12.95 | -0.416 |
| [1820 Gini x hcint] | (-0.24) | (-0.13) | (-0.26) | (-1.18) | (-1.04) |
| External finance interaction | -0.0677 | -0.0616 | -0.0778 | 21.95 | 0.408 |
| [1820 Gini x extfin] | (-0.21) | (-0.25) | (-0.34) | (-1.54) | (-0.79) |
| Contract intensity interaction | -0.446 | -0.143 | -0.708 | -50.01** | -1.645 |
| [1820 Gini x contract] | (-0.91) | (-0.25) | (-1.41) | (-2.65) | (-1.80) |
| Legal origin (Common law reference group) | | | | | |
| French legal origin | 0.562* | -0.0705 | 0.307 | 14.1 | -0.00992 |
| | (-2.23) | (-0.32) | (-1.42) | (-1.46) | (-0.02) |
| Socialist legal origin | -0.567 | -0.161 | -0.413 | -10.17 | -3.430*** |
| | (-1.84) | (-0.73) | (-1.73) | (-0.65) | (-7.72) |
| German legal origin | -0.159 | -0.225 | -0.247 | 12.33 | -0.917 |
| | (-0.30) | (-0.76) | (-0.55) | (-0.60) | (-1.64) |
| Scandinavian legal origin | 0.288 | 0.377 | 0.492 | -10.68 | -1.589** |
| | (-0.85) | (-1.03) | (-1.73) | (-0.71) | (-2.93) |
| Was not a colony | 0.888* | 0.644 | 1.655*** | 98.55*** | -0.26 |
| | (-2.12) | (-1.65) | (-3.99) | (-4.31) | (-0.45) |
| Population average education in 1970 | 0.229*** | 0.979*** | 0.108** | 5.62 | 0.183* |
| | (-3.51) | (-25.55) | (-2.98) | (-1.68) | (-2.25) |
| Former Spanish colony | -0.559*** | 1.237*** | -0.328 | -12.40* | 1.221*** |
| | (-3.82) | (-6.96) | (-1.71) | (-2.20) | (-3.81) |
| Former British colony | 0.941* | -0.127 | 0.965** | 69.01*** | 1.850** |
| | (-2.23) | (-0.36) | (-2.74) | (-3.67) | (-3.24) |
| Former French colony | 0 | 0 | 0 | 0 | 0 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Latitude | 0.00337 | 0.00258 | -0.00251 | 0.206 | 0.0426*** |
| | (-0.37) | (-0.39) | (-0.34) | (-0.48) | (-3.84) |
| Longitude | 0.00196 | -0.000029 | 0.00563 | 0.149 | 0.0319*** |
| | (-0.35) | (-0.01) | (-1.27) | (-0.47) | (-4.44) |
| N | 969 | 969 | 969 | 969 | 969 |
| F-excluded | 9.350 | 210.730 | 18.180 | 17.970 | 63.010 |

| | (16) | (17) | (18) | (19) | (20) |
|---|---|---|---|---|---|
| | | | Average real salary per employee | | |
| | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 |
| Physical capital intensity interaction | -0.141 | -0.109 | -0.168 | -6.606 | -0.123 |
| [1820 Gini x capint] | (-1.04) | (-0.67) | (-1.23) | (-1.37) | (-0.78) |
| School intensity interaction | 0.00916 | 0.0196 | -0.046 | -9.111 | -0.0497 |
| [1820 Gini x hcint] | (-0.04) | (-0.13) | (-0.32) | (-0.97) | (-0.12) |
| External finance interaction | 0.0437 | -0.101 | 0.0763 | 16.49 | -0.107 |
| [1820 Gini x extfin] | (-0.16) | (-0.52) | (-0.38) | (-1.24) | (-0.22) |
| Contract intensity interaction | -0.149 | -0.139 | -0.782 | -36.15** | -0.369 |
| [1820 Gini x contract] | (-0.40) | (-0.31) | (-1.86) | (-2.59) | (-0.47) |
| Legal origin (Common law reference group) | | | | | |
| French legal origin | 0.564* | -0.0667 | 0.261 | 15.85 | 0.218 |
| | (-2.39) | (-0.31) | (-1.19) | (-1.61) | (-0.56) |
| Socialist legal origin | -0.577* | -0.134 | -0.486* | -6.854 | -3.051*** |
| | (-2.08) | (-0.63) | (-2.04) | (-0.49) | (-7.28) |
| German legal origin | -0.146 | -0.2 | -0.311 | 14.87 | -0.535 |
| | (-0.29) | (-0.69) | (-0.69) | (-0.76) | (-1.01) |
| Scandinavian legal origin | 0.324 | 0.384 | 0.417 | -9.124 | -1.184* |
| | (-1.08) | (-1.08) | (-1.48) | (-0.67) | (-2.21) |
| Was not a colony | 0.984* | 0.576 | 1.689*** | 92.49*** | -0.444 |
| | (-2.32) | (-1.63) | (-4.54) | (-4.10) | (-0.86) |
| Population average education in 1970 | 0.234*** | 0.978*** | 0.103** | 5.684 | 0.204** |
| | (-3.69) | (-25.7) | (-2.9) | (-1.69) | (-2.61) |
| Former Spanish colony | -0.495*** | 1.220*** | -0.363* | -13.83* | 1.393*** |
| | (-3.53) | (-8.56) | (-2.43) | (-2.48) | (-4.44) |
| Former British colony | 0.991* | -0.178 | 1.001** | 65.14*** | 1.664*** |
| | (-2.46) | (-0.54) | (-2.98) | (-3.60) | (-3.30) |
| Former French colony | 0 | 0 | 0 | 0 | 0 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Latitude | 0.000452 | 0.00321 | -0.000952 | 0.265 | 0.0337** |
| | (-0.06) | (-0.67) | (-0.18) | (-0.65) | (-2.83) |
| Longitude | 0.00145 | -5.53E-05 | 0.00541 | 0.164 | 0.0317*** |
| | (-0.26) | (-0.01) | (-1.23) | (-0.52) | (-4.3) |
| N | 1021 | 1021 | 1021 | 1021 | 1021 |
| F-excluded | 10.090 | 272.370 | 16.890 | 17.350 | 56.450 |

Note: Robust standard errors clustered at country-level shown in parentheses. Significant at the ***p<0.01, ** p<0.05 and * p<0.1 levels.

**Table A.4** First stage IV regression of results shown in Table 10

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Real output | | | | | Number of firms | | | | | Number of employees per firm | | | | | Average real salary per employee | | | | |
| | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 | Ln real per capita GDP in 1980 | Population average education in 1980 | Physical capital 1980 | Domestic credit to private sector (% of GDP) in 1980 | Economic freedom in 1980 |
| Physical capital intensity interaction | -0.0256 | -0.0311 | -0.0742 | 3.414 | 0.131 | -0.0464 | -0.104 | -0.0888 | 1.017 | 0.0478 | -0.132 | -0.0787 | -0.0800 | -3.323 | -0.125 | -0.129 | -0.0578 | -0.0622 | -3.283 | -0.148 |
| [1980 Gini x capint] | (-0.35) | (-0.28) | (-1.01) | (1.24) | (0.95) | (-0.57) | (-0.93) | (-1.04) | (0.51) | (0.75) | (-1.70) | (-0.66) | (-0.83) | (-1.07) | (-1.13) | (-1.72) | (-0.56) | (-0.75) | (-1.02) | (-1.33) |
| School intensity interaction | 0.0236 | 0.0697 | -0.200 | -4.335 | 0.0993 | 0.263 | 0.0873 | -0.107 | -1.346 | 0.202 | -0.320 | 0.240 | -0.0116 | -27.90 | -0.273 | -0.328 | 0.235 | -0.0750 | -22.90 | -0.0526 |
| [1980 Gini x hcint] | (0.14) | (0.58) | (-1.27) | (-0.53) | (0.47) | (1.78) | (0.86) | (-0.70) | (-0.20) | (1.12) | (-0.67) | (1.04) | (-0.04) | (-1.61) | (-0.49) | (-0.76) | (1.14) | (-0.32) | (-1.44) | (-0.10) |
| External finance interaction | 0.0903 | -0.157 | 0.0906 | 4.117 | -0.232 | -0.269 | -0.117 | 0.0892 | 0.843 | -0.244 | 0.367 | -0.336 | -0.120 | 33.91 | 0.444 | 0.375 | -0.322 | -0.00342 | 26.24 | 0.101 |
| [1980 Gini x extfin] | (0.41) | (-0.99) | (0.40) | (0.37) | (-0.69) | (-1.63) | (-0.86) | (0.46) | (0.11) | (-1.02) | (0.64) | (-1.13) | (-0.35) | (1.58) | (0.65) | (0.75) | (-1.23) | (-0.01) | (1.35) | (0.16) |
| Contract intensity interaction | 0.268 | -0.125 | -0.646* | 4.815 | 0.433 | 0.345 | -0.244 | -0.327 | -3.956 | 0.0263 | -0.612 | -0.0715 | -0.308 | -41.30 | -1.179 | -0.527 | 0.0751 | -0.320 | -28.45 | -0.548 |
| [1980 Gini x contract] | (0.97) | (-0.35) | (-2.25) | (0.41) | (0.92) | (1.14) | (-0.75) | (-1.09) | (-0.39) | (0.08) | (-1.13) | (-0.15) | (-0.75) | (-1.85) | (-1.58) | (-1.08) | (0.19) | (-0.89) | (-1.40) | (-0.82) |
| Legal origin (Common law reference group) | | | | | | | | | | | | | | | | | | | | |
| | 0.380 | -0.0864 | 0.407 | 29.10* | 0.489 | 0.240 | -0.123 | 0.331 | 27.09* | 0.375 | 0.659* | -0.113 | 0.325 | 30.44* | 0.335 | 0.670** | -0.127 | 0.339 | 28.13* | 0.287 |
| French legal origin | (1.41) | (-0.47) | (1.89) | (2.18) | (1.39) | (0.96) | (-0.65) | (1.70) | (2.23) | (1.08) | (2.51) | (-0.46) | (1.29) | (2.14) | (0.93) | (2.66) | (-0.53) | (1.32) | (1.98) | (0.80) |
| | -0.690** | -0.129 | -0.558* | 5.699 | -2.610*** | -0.138 | 0.0527 | -0.0424 | 19.70 | -2.205*** | -0.882 | 0.0663 | -0.432 | -21.13 | -3.260*** | -0.878* | 0.0648 | -0.477 | -17.39 | -3.053*** |
| Socialist legal origin | (-2.86) | (-0.57) | (-2.38) | (0.48) | (-7.55) | (-0.39) | (0.22) | (-0.10) | (1.65) | (-5.16) | (-1.89) | (0.23) | (-1.61) | (-1.09) | (-6.13) | (-2.06) | (0.23) | (-1.82) | (-0.93) | (-5.98) |
| | -0.216 | -0.124 | -0.116 | 36.63* | 0.183 | -0.101 | -0.274 | -0.344 | 31.40 | 0.0140 | -0.479 | 0.00558 | -0.265 | 1.136 | -0.747 | -0.462 | 0.00775 | -0.303 | 3.791 | -0.538 |
| German legal origin | (-0.59) | (-0.48) | (-0.35) | (2.04) | (0.41) | (-0.19) | (-1.05) | (-0.75) | (1.62) | (0.03) | (-0.72) | (0.02) | (-0.56) | (0.05) | (-1.16) | (-0.73) | (0.02) | (-0.66) | (0.16) | (-0.84) |
| | 0.208 | 0.261 | 0.592** | 6.535 | -0.774 | 0.0781 | 0.203 | 0.540* | 6.764 | -0.941* | 0.347 | 0.367 | 0.512 | 7.241 | -1.136** | 0.385 | 0.355 | 0.512 | 3.340 | -1.103** |
| Scandinavian legal origin | (0.93) | (0.89) | (2.58) | (0.75) | (-1.92) | (0.40) | (0.70) | (2.56) | (0.84) | (-2.25) | (1.72) | (0.99) | (1.70) | (0.66) | (-2.77) | (1.92) | (0.99) | (1.76) | (0.31) | (-2.73) |
| Was not a colony | 0.815* | 0.498 | 1.633*** | 82.03*** | -0.637 | 0.513 | 0.599 | 1.735*** | 88.13*** | -0.838 | 1.193** | 0.423 | 1.673*** | 108.0*** | -0.459 | 1.251** | 0.398 | 1.666*** | 100.2*** | -0.455 |
| | (2.06) | (1.85) | (5.20) | (3.79) | (-1.14) | (1.18) | (1.82) | (4.78) | (4.08) | (-1.47) | (2.66) | (1.07) | (4.48) | (4.18) | (-0.67) | (2.93) | (1.08) | (5.22) | (4.16) | (-0.71) |
| Population average education in 1970 | 0.244*** | 0.979*** | 0.114** | 6.816 | 0.230** | 0.208** | 0.961*** | 0.0772* | 5.888 | 0.186* | 0.227*** | 0.981*** | 0.108** | 6.101* | 0.200** | 0.231*** | 0.980*** | 0.107** | 5.922 | 0.207** |
| | (3.78) | (27.39) | (3.22) | (1.91) | (3.00) | (3.15) | (25.02) | (2.11) | (1.79) | (2.51) | (3.83) | (25.87) | (3.09) | (2.02) | (2.72) | (4.02) | (26.26) | (3.21) | (1.92) | (2.81) |
| Former Spanish colony | -0.444** | 1.266*** | -0.448** | -18.91** | 1.208*** | -0.488** | 1.300*** | -0.356* | -15.38** | 1.061** | -0.596*** | 1.260*** | -0.333 | -16.03* | 1.171*** | -0.546*** | 1.252*** | -0.383* | -17.87** | 1.376*** |
| | (-3.04) | (9.35) | (-3.09) | (-3.19) | (3.83) | (-3.13) | (7.93) | (-2.01) | (-2.70) | (3.08) | (-3.53) | (7.24) | (-1.66) | (-2.55) | (3.47) | (-3.67) | (8.33) | (-2.29) | (-3.07) | (3.99) |
| Former British colony | 0.788 | -0.198 | 1.073** | 62.93*** | 1.641** | 0.543 | -0.185 | 1.055** | 63.11*** | 1.463* | 1.222* | -0.325 | 0.984** | 80.51*** | 1.752** | 1.250** | -0.347 | 1.001*** | 74.92*** | 1.672** |
| | (1.96) | (-0.70) | (3.06) | (3.73) | (2.95) | (1.33) | (-0.60) | (2.92) | (3.96) | (2.58) | (2.41) | (-1.01) | (3.09) | (3.52) | (2.69) | (2.66) | (-1.15) | (3.39) | (3.42) | (2.82) |
| Former French colony | -0.0113 | -0.800 | -0.104 | 38.47 | 1.850* | 0.189 | -0.478 | 0.380 | 60.14** | 1.712 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | (-0.02) | (-1.49) | (-0.15) | (1.78) | (2.04) | (0.25) | (-0.82) | (0.46) | (2.67) | (1.65) | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) | (.) |
| Latitude | 0.00114 | 0.00473 | -0.00418 | 0.0304 | 0.0254** | 0.00833 | 0.00547 | -0.0000583 | -0.0128 | 0.0355** | 0.00299 | 0.00253 | -0.00272 | 0.0390 | 0.0380*** | 0.000816 | 0.00288 | -0.00173 | 0.197 | 0.0330** |
| | (0.18) | (1.21) | (-0.87) | (0.09) | (2.64) | (1.06) | (0.98) | (-0.01) | (-0.04) | (2.62) | (0.43) | (0.42) | (-0.36) | (0.11) | (3.58) | (0.13) | (0.60) | (-0.34) | (0.58) | (3.21) |
| Longitude | 0.00130 | 0.00143 | 0.00255 | 0.0321 | 0.0267*** | 0.00327 | 0.00265 | 0.00638 | 0.0826 | 0.0285*** | 0.00156 | 0.000158 | 0.00555 | 0.0853 | 0.0306*** | 0.00127 | 0.0000273 | 0.00508 | 0.122 | 0.0314*** |
| | (0.27) | (0.38) | (0.65) | (0.12) | (3.76) | (0.63) | (0.66) | (1.56) | (0.29) | (3.83) | (0.31) | (0.03) | (1.19) | (0.32) | (4.21) | (0.25) | (0.01) | (1.12) | (0.45) | (4.19) |
| N | 1140 | 1140 | 1140 | 1140 | 1140 | 1122 | 1122 | 1122 | 1122 | 1122 | 969 | 969 | 969 | 969 | 969 | 1021 | 1021 | 1021 | 1021 | 1021 |
| F-excluded | 8.690 | 263.190 | 12.400 | 33.220 | 29.000 | 5.110 | 172.960 | 11.910 | 12.810 | 12.270 | 8.300 | 218.520 | 18.120 | 42.570 | 79.910 | 8.780 | 295.210 | 17.690 | 48.080 | 50.080 |

Note: Robust standard errors clustered at country-level shown in parentheses. Significant at the ***p<0.01, ** p<0.05 and * p<0.1 levels.