ELSEVIER

Journal of Development Economics 84 (2007) 755 – 776

JOURNAL OF Development ECONOMICS

www.elsevier.com/locate/econbase

Inequality does cause underdevelopment: Insights from a new instrument ☆

William Easterly

New York University, United States

Received 24 December 2005; received in revised form 23 October 2006; accepted 1 November 2006

Abstract

Consistent with the provocative hypothesis of Engerman and Sokoloff [Engermann, Stanley and Kenneth Sokoloff (1997), "Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States," in Stephen Haber, ed. How Latin America Fell Behind, Stanford CA: Stanford University Press., Sokoloff, Kenneth L. and Stanley L. Engerman (2000), Institutions, Factor Endowments, and Paths of Development in the New World, Journal of Economic Perspectives v14, n3, 217–32.], this paper confirms with cross-country data that agricultural endowments predict inequality and inequality predicts development. The use of agricultural endowments – specifically the abundance of land suitable for growing wheat relative to that suitable for growing sugarcane – as an instrument for inequality is this paper's approach to problems of measurement and endogeneity of inequality. The paper finds inequality also affects other development outcomes – institutions and schooling – which the literature has emphasized as mechanisms by which higher inequality lowers per capita income. It tests the inequality hypothesis for development, institutional quality and schooling against other recent hypotheses in the literature. While finding some evidence consistent with other development fundamentals, the paper finds high inequality to independently be a large and statistically significant barrier to prosperity, good quality institutions, and high schooling.

JEL classification: O10; O57; D31; 12; N10
Keywords: inequality; institutions; schooling; growth

☆ I am grateful to Sergio Kurlat and Julia Schwenkenberg for research assistance and to the editor, an anonymous referee, Daron Acemoglu, Michael Kremer, Ross Levine, Martin Ravallion, and participants in the NBER Summer Institute Workshop on Income Distribution, New York University, the University of Maryland, Boston University, Cornell University, the University of Texas, Stanford University and Johns Hopkins University for helpful comments.
E-mail address: William.Easterly@NYU.edu.

0304-3878/$ - see front matter
doi:10.1016/j.jdeveco.2006.11.002

"No society can surely be flourishing and happy, of which the far greater part of the members are poor and miserable." Adam Smith, The Wealth of Nations, p. 79, 1776.

The World Bank (2005) World Development Report says in its introduction: "We now have considerable evidence that equity is also instrumental to the pursuit of long-term prosperity in aggregate terms for society as a whole." Despite this claim, the effect of inequality on economic development continues to be hotly debated. A first wave of the development literature argued that high inequality could help growth by directing more income to high-saving capitalists (Lewis, 1954, Kaldor, 1956, 1961). The new growth literature reversed this prediction with a set of theoretical models and empirical studies arguing that inequality harmed growth through political economy channels or through constraints on human capita accumulation or occupational choice (Galor and Zeira, 1993; Banerjee and Newman, 1993; Alesina and Rodrik, 1994; Persson and Tabellini, 1994, followed by many other authors). This in turn has brought forth a challenge from Forbes (2000), Barro (2000), and Banerjee and Duflo (2003), who either confirm the original development notion that inequality has a positive relationship with growth, or argue that the relationship can take either sign (and in the case of Banerjee and Duflo that it is changes rather than levels of inequality that matter). So which is it?

One confusion in the theoretical and empirical analysis of inequality is between what we could call structural inequality and market inequality. Structural inequality reflects such historical events as conquest, colonization, slavery, and land distribution by the state or colonial power; it creates an elite by means of these non-market mechanisms. Market forces also lead to inequality, but just because success in free markets is always very uneven across different individuals, cities, regions, firms, and industries. So the recent rise in inequality in China is clearly market-based, while high inequality in Brazil or South Africa is just as clearly structural. Only structural inequality is unambiguously bad for subsequent development in theory; market inequality has ambiguous effects — it could have some of the adverse effects cited in the above models, but eliminating it would obviously have negative incentive effects.[1]

A vast empirical literature already exists on competing hypotheses on inequality, so any new empirical paper has to pass a high threshold. This paper follows an empirical strategy inspired by a hypothesis due to economic historians Engermann and Sokoloff (1997) and Sokoloff and Engerman (2000) (henceforth ES) (followed by a continuing stream of papers such as Engermann and Sokoloff, 2005; Engerman et al., 2002; Khan and Sokoloff, 2004; Sokoloff and Zolt, 2005). They suggest factor endowments are a central determinant of inequality (what this paper calls structural inequality), and (structural) inequality in turn is a determinant of bad institutions, low human capital investment, and underdevelopment. Hence this paper will use measures of factor endowments as instruments that can be used to assess the causal inequality and development relationship. ES argues that the land endowments of Latin America lent themselves to commodities featuring economies of scale and the use of

[1] The World Development Report (World Bank, 2005) attempted to make some distinction along these lines by distinguishing "inequality of opportunities" from "inequality of outcomes." However, it's not clear that this really gets at the key issue. They give the example of "inequality of opportunities" as exemplified by a child born in a poor region as having less opportunity than one born in a rich region. However, since market-based growth typically leads to uneven outcomes across regions (or across almost any other unit of analysis), market inequality inevitably and unavoidably leads to this kind of "inequality of opportunities."

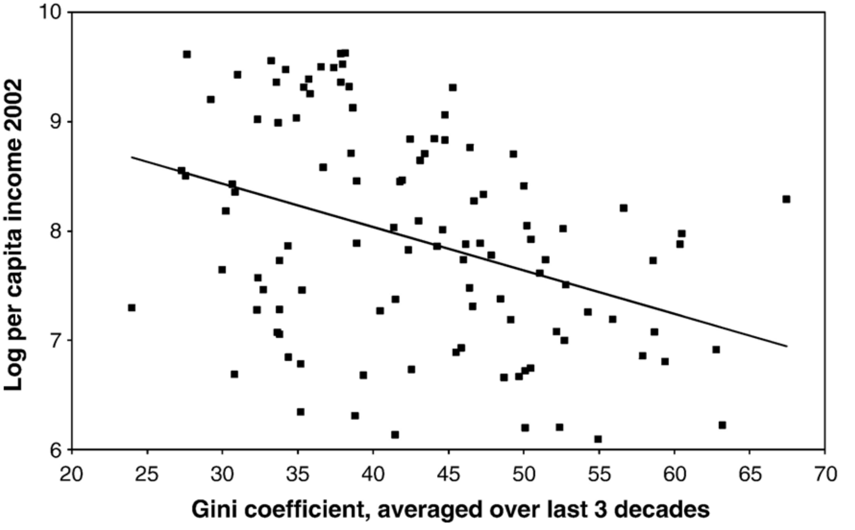

Fig. 1. Per capita income and inequality.

slave labor (sugar cane is their premier example) and thus were historically associated with high inequality.[2] In contrast, the endowments of North America lent themselves to commodities grown on family farms (wheat being exhibit A) and thus promoted the growth of a large middle class. The ES work suggests a natural instrument for inequality: the exogenous suitability of land for wheat versus sugarcane. This instrument is particularly attractive because it picks out the variation due to structural inequality rather than that due to market inequality.

With this instrument, one can address one important piece of evidence that has been under-emphasized in this debate. There is a strong association between inequality (measured here by the Gini coefficient averaged over the last 3 decades) and the level of per capita income today (Fig. 1). The association is highly significant (correlation $= -.37$, t-statistic $= 5.6$).[3]

If this link is causal from inequality to income, it provides further evidence that there is a long-run negative association between growth (of which log income is of course the cumulative sum) and inequality. Inequality is highly persistent over time, so the last 3 decades' average inequality likely reflects cross-sectional differences that have been present for some time (as this paper will document). The causality could be the reverse — maybe rich societies can afford redistribution. The use of the ES instrument allows us to address the causality issue. A first look at the data suggests that the log of the ratio of land suitable for wheat to

[2] Sugarcane is a labor-intensive crop requiring cheap labor to be economical. The sugarcane stalks are also very bulky to transport long distances and must be ground within days of the harvest. This led to economies of scale and led the typical sugar holding historically to be a plantation that was large enough to produce enough sugarcane to cover the fixed costs of a sugar mill right on the plantation. See the discussion in Abbott (1990 pp. 61–62, 75).

[3] The cross-country relationship between inequality and development has already been the subject of a vast empirical literature with a focus on the reverse relationship — the Kuznets curve between income and inequality. I do not attempt to address the question of the existence of the Kuznets curve here and I restrict attention to the possible linear relationship from inequality to income. For some of the classic references to this earlier literature, see Anand and Kanbur (1993) and Ravallion (1997).

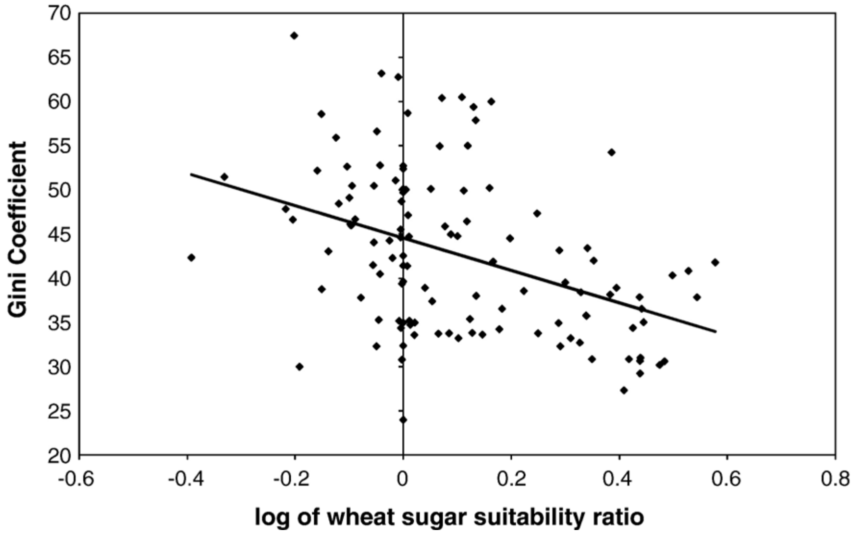

Fig. 2. Log of wheat–sugar suitability ratio and inequality.

that for sugarcane (data and definition to be discussed in more detail below) has considerable predictive power for inequality (Fig. 2, correlation = −.41, *t*-statistic = −5.6).

The ES hypothesis has predictions for some of the intermediating mechanisms that promote development. ES suggest that the elite in Latin America opposed democracy and mass investment in human capital because they were afraid of the poor majority gaining power (people with more human capital are more politically active). The elite feared in particular that the majority would use power to redistribute income and rents away from the elite towards the majority. ES note that even when Latin American nations were nominal democracies, they imposed literacy or wealth requirements for voting that sharply restricted the franchise well into the 20th century. And ES point out that Latin America trailed well behind North America in establishing universal free schooling and raising literacy. Banerjee and Iyer (2005) have similar evidence from another region: historically landlord-dominated districts of West Bengal in India fare worse on agricultural productivity and schooling than small-holder districts.

The ES hypothesis has been influential in the literature, and has already attracted critics (for a summary of some criticisms, see Przeworski, 2004), but has received little econometric testing. The ES story provides a set of sharp but simple hypotheses that can be taken to the cross-country data and tested against competing hypotheses. Having the empirical design guided by the ES story may lead to over-simplification, but it has the more than compensating virtue of avoiding open-ended cross-country regressions that have weak credibility due to the potential for data mining.

1. Literature review

Whether a high initial level of inequality hinders economic development is one of the most highly contested questions in the recent literature on economic growth and development. Unlike much empirical growth research, theory and a priori testable mechanisms have in part guided the inequality and growth literature. The three principal mechanisms that researchers have proposed have been redistributive policies, quality of institutions, and human capital. The first wave of the recent literature saw high inequality lowering growth because the poor majority would vote for redistributive rather than growth-enhancing policies (Alesina and Rodrik, 1994; Persson and Tabellini, 1994).

Other authors besides ES have also proposed an institutional mechanism in which a rich elite will suppress democracy and equal rights before the law so as to preserve their privileged position. (e.g. Bourguignon and Verdier, 2000). Acemoglu (2005) also has a model in which the oligarchy blocks democracy to preserve its privileges.

Rajan and Zingales (2006) have a more general argument: that the elite and the educated middle class will form a coalition against education for the poor so as to prevent both large-scale reform and erosion of the rents accruing to the already educated. Like this paper, these authors argue that factor endowments are the underlying determinant, in their case affecting "constituencies" for and against different policy changes. However, Rajan and Zingales (2006) do not pursue the empirical line of inquiry in this paper.

Inequality could also lead to politically unstable institutions as power swings back and forth between redistributive populist factions and oligarchy-protecting conservative factions (Perotti, 1996; Benabou, 1996), and political instability itself lowers growth (Alesina et al., 1996). The human capital mechanism is that imperfect capital markets will prevent human capital accumulation by the poor majority (Galor and Zeira, 1993; Perotti, 1996; Galor and Moav, 2006; Galor et al. 2006). Assortative matching between marriage partners or other sorting will make this problem worse (Fernandez et al., 2005; Fernandez and Rogerson, 2001).

Whether in fact a negative relationship holds between inequality and growth has been hotly contested. The first studies in the recent wave of literature did find a relationship (Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Clarke, 1995). These findings offered a partial explanation for the stylized fact that growth had been high in egalitarian East Asia and low in unequal Africa and Latin America (Birdsall et al., 1995; World Bank, 1993). Perotti (1996) challenged some of the mechanisms allegedly at work in these findings (e.g. he found no evidence for higher tax rates in more unequal societies), but did find a relationship between inequality and growth through political instability and human capital. A challenge to this literature came from researchers who exploited the panel dimensions of the data (Forbes, 2000; Barro, 2000; Banerjee and Duflo, 2003). These authors found a zero, nonlinear, or even positive relationship between inequality and growth. The positive relationship of Forbes (2000) would seem to confirm a long tradition in economic thought of beneficent inequality that concentrates income among the rich who save more and increases the incentive to work hard to move up the ladder. However, there is some question as to whether panel methods using relatively high frequency data are the appropriate test of a relationship whose mechanisms seem to be long run characteristics that are fairly stable over time.

Another criticism of the literature has been the poor quality of the data on inequality. The first wave of results was challenged on these grounds of poor data quality by Deininger and Squire (1996, 1998), who offered a new expanded and higher quality dataset. More recently, the Deininger and Squire data themselves have come under attack (Atkinson and Brandolini, 2001). Using a smaller dataset mainly applying to rich countries (the Luxembourg Income Survey (LIS), Atkinson and Brandolini pointed out that the Deininger and Squire inequality data are derived from several different methodologies, including individual vs. household, income vs. expenditure, and pretax vs. post-tax. In response to these criticisms, the UN's

World Institute for Development Economics Research (WIDER) produced a new international database with emphasis on cross-country comparability (WIDER 2000), drawing on both the LIS and Deininger and Squire. The issue of data quality in international inequality data is far from resolved. Another advantage of the instrumentation strategy in this paper could be that the econometric problems of measurement error in inequality will be alleviated by instrumental variables.

The specification of mechanisms by the inequality literature is helpful because it allows us to test the inequality hypothesis against other determinants of economic development that have been proposed in the literature. Schooling and institutions have both been proposed as central determinants of economic development, with these in turn depending on exogenous country characteristics.

Acemoglu et al. (2001, 2002, 2005a,b) (AJR) suggest institutional quality as a fundamental determinant of economic development, instrumenting for institutions with mortality rates facing European settlers in the colonial era. AJR characterized settler colonies as producing institutions that facilitated broad-based development, while non-settler colonies adopted extractive institutions that were designed to capture the rents for the colonizers. The literature started by AJR is currently in a state of flux due to serious questions about the underlying data on mortality rates raised by Albouy (2006). Easterly and Levine (1997a,b) and Mauro (1995) have a competing hypothesis, suggesting that ethnic fractionalization led to poor institutional outcomes.[4]

Finally, formal schooling is argued to be a fundamental determinant of output per worker in a literature that began with Schultz (1963), Krueger (1968), Easterlin (1981) and continued with Mankiw, Romer, and Weil (1992) and Mankiw (1995). Glaeser et al. (2004) argue that human capital crowds out institutions as a determinant of development. Easterly and Levine (1997a,b) and Alesina et al. (1999) argue that schooling is affected by ethnic fractionalization because of the difficulty of different ethnic groups agreeing on the type and quality of public services.

Some other papers relate level of development or growth directly to exogenous country characteristics. Easterly and Levine (1997a,b) relate growth and per capita income directly to ethnolinguistic fractionalization. Bloom and Sachs (1998) and Sachs and Warner (1997) suggest that tropical location, landlocked location, and natural resource exporting directly inhibit development or growth. Other scholars have failed to confirm the independent importance of tropical location, suggesting that its effects go through institutions (Easterly and Levine, 2003; Rodrik, Subramian, and Trebbi 2004; Acemoglu, Johnson, and Robinson 2002).

Another branch of the literature stresses legal origin as a fundamental underpinning development. La Porta et al. (1999) alternatively link the quality of government institutions to legal origins, with French legal origin having a negative effect on institutions. La Porta et al. (1998) find that legal origin influenced financial institutions. Levine (1999, 2005) found that legal origin helped explain financial intermediary development. Levine, Loayza, and Beck (2000) and Beck, Levine, and Loayza (2000) found that using legal origin as an instrument for finance helped identify the causal effect of financial development on GDP growth, investment, and productivity growth.

This paper continues work started in an earlier paper, which focused on the share of the middle class (Easterly, 2001). That earlier paper also tested the effect of inequality of development with a system predicting commodity exporting by tropical location and predicting middle class share with commodity exporting, then estimating an equation for income and growth as a function of middle class share and ethnic fractionalization (the “middle class consensus”). The present paper

[4] Woolcock et al. (2001) and Isham et al. (2005) found that institutions are worse in resource-rich than in resource-poor economies, and that “point-source” and coffee and cocoa resources were associated with worse institutions compared to “diffuse” resource economies. I will discuss these results more below.

takes these results further by specifying an instrument that is more specific to a rich historical literature that has identified it a priori, by estimating the intermediating mechanisms as a function of inequality, and by running a "horse race" with other competing determinants hypothesized by the previous literature.

In sum, there are at least four plausible alternatives to the inequality hypothesis for development, institutions, and schooling: (1) settler mortality, (2) ethnic fractionalization, (3) tropical location, and (4) legal origin. Inequality could simply be proxying for one of these other variables. Given the unresolved debate about the settler mortality data, I will combine hypotheses (1) and (3), since high settler mortality is strongly associated with tropical location. I will thus test whether the inequality relationship holds up when we also control for exogenous measures of ethnic fractionalization, tropical location, and legal origin.[5]

2. Empirical results

2.1. The data

International inequality datasets are deeply flawed, as mentioned above, so any use of the data in research has to make the best of some bad choices. One could conclude the flaws are so serious as to disqualify the data altogether, but this study explores whether the data contain some signal as well as noise to test the inequality and development hypotheses. I use the WIDER (2000) dataset. This dataset helps address comparability of surveys across countries by classifying the type of survey each inequality observation is based on along the following dimensions (1) earnings versus total income, (2) income versus expenditure, (3) gross versus net income (after taxes and transfers), (4) household versus individual units. I use two measures of inequality from the dataset: (1) the Gini coefficient, and (2) the share of income accruing to the top quintile. I regress both measures on dummy variables capturing the dimensions above, all of which potentially bias the inequality measure — for example, inequality of expenditure is generally less than inequality of income, and of course post-tax income has less inequality than pretax income. The household versus individual unit distinction was not significant and I omitted this dimension in adjusting the data. The shift coefficients on the dummies were then used to adjust the inequality measures so as to remove average differences that could be traced to different survey definitions. This procedure is far from perfect, as it leaves some idiosyncratic noise across countries based on the degree to which survey differences matter, but the procedure at least removes the average bias due to survey methodology. These corrections are in the same spirit as the original Deininger and Squire (1996) exercise.

There is also the problem that the household surveys on which inequality measures are based are intrinsically noisy and can imply abrupt and implausible changes from one survey to the next. This study reduces this noise problem by taking the average for each country of all inequality measures (adjusted as described) over 1960–98.

On the crop endowments measure, I have data from the FAO about the percent of national arable land area suitable for different crops, taking into account such factors as soil, rainfall, temperature, and elevation.[6] Harlan (1992 pp. 53–60) discusses the botanical mechanisms by

[5] Levine (2005) has a careful related analysis of tropical location and legal origin as affecting legal outcomes and financial development.

[6] Food and Agriculture Organization, Global Agro-Ecological Zones 2000, Web site http://www.fao.org/ag/AGL/agll/gaez/index.htm.

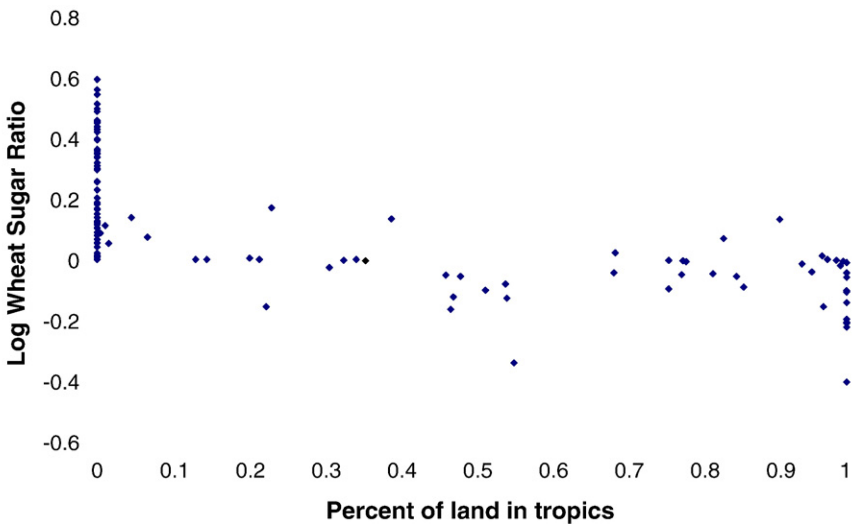

Fig. 3. Log of wheat–sugar ratio and percent of land in tropics.

which different ecological zones are compatible with some types of crops and not with others. For example, sugarcane does not grow below 15–16 °C, needs an average of about 1200–1500 mm rainfall a year, and favors level rather than steeply elevated lands (Blume, 1985, pp. 44–46). In contrast, wheat photosynthesizes at low temperatures (15 to 20 °C) and cannot be grown in the warm tropics (FAO, 2005). These characteristics have thus plausibly remained constant over time, thus reflecting historical conditions for inequality.

The variable I will use and call the "wheat–sugar ratio" is defined as LWHEATSUGAR = log [(1 + share of arable land suitable for wheat)/(1 + share of arable land suitable for sugarcane)].

Given the forgoing discussion, the wheat–sugar ratio could simply be proxying for whether the country is in the tropics. There is certainly a strong correlation (correlation = −.66, *t*-statistic = −10.75), but Fig. 3 shows that there is still considerable variation in the wheat–sugar ratio both in tropical and non-tropical areas.

While LWHEATSUGAR is a less precise measure than production data on whether different crops are actually grown, since it is a technical guess as to whether certain land areas are "suitable," it is exogenous while crop production is endogenous. In any case, the measure of land suitability does predict crops actually grown. I have data from Mitchell's (2003) historical statistics on acreage devoted to wheat and sugarcane in 1920 in various countries. For both 1920 sugarcane and wheat acreage, the relationship to the corresponding FAO data on share of arable land suitable for the respective crop is highly significant. Using FAO production statistics on whether wheat and sugar are grown in 1999, I also find a strong association with the FAO suitability measure (results available on request).

Another important dataset is on the share of agricultural land occupied by family farms from 1858 to 1998, assembled from a large array of sources by Vanhanen (in press).[7] Even given the high uncertainty and many methodological problems involved in using data from

[7] I am grateful to Adam Przeworski for calling this data to my attention.

Table 1
Share of family farms in different decades regressed on wheat–sugar endowment

Dependent variable	Coefficient on lwheatsugar	*t*-stat	Observations	*R*-squared
FF1998	15.85	−1.29	117	0.02
FF1988	28.10	(2.07)*	102	0.05
FF1978	45.25	(3.19)**	95	0.13
FF1968	49.66	(3.53)**	94	0.15
FF1958	64.73	(5.31)**	72	0.27
FF1948	50.35	(4.80)**	63	0.23
FF1938	52.91	(4.91)**	54	0.25
FF1928	45.98	(5.13)**	54	0.26
FF1918	40.49	(4.49)**	47	0.21
FF1908	38.77	(4.35)**	44	0.21
FF1898	36.50	(4.22)**	40	0.22
FF1888	36.06	(4.19)**	40	0.22
FF1878	33.13	(3.65)**	39	0.18
FF1868	25.62	(2.70)*	37	0.11
FF1858	26.70	(2.77)**	35	0.14

Robust *t* statistics in parentheses. * significant at 5%; ** significant at 1%.
FF*xxxx* is share of family farms in agricultural land in year *xxxx*; source: Vanhanen (in press).

many different sources, this data is valuable to test whether the ES story about a high endowment of wheat land relative to sugarcane land predicts landowning dominated by family farms. The share of family farms is itself a measure of inequality, and hence we can also get some idea if today's inequality is correlated with that from the past.

I first test the link between the wheat–sugar ratio and share of family farms in Table 1. The wheat–sugar endowment ratio is significantly correlated with the share of family farms in the 19th century, as well with all dates except for the most recent: 1988 and 1998. The strength of the relationship peaks in about 1958, when the size of the sample grows to include many developing countries. These patterns are plausible — the increased variation associated with adding more developing countries strengthens the relationship from the 19th century to the mid-20th century, while changes in agricultural technology and the falling relative importance of agriculture in recent years may account for the disappearance of the relationship.

I next use the family farm data to discuss whether current inequality reflects historical inequality. Previous literature has tended to affirm that it does. Lindert and Williamson (2003) argue in a broad survey that there is no systematic tendency for within-country inequality to change over the last two centuries. Lindert (2000) finds that sketchy data suggest that the Gini for income inequality in England in the 17th and 18th centuries was roughly the same as in 1995, although it fluctuated in between. Likewise, he finds the wealth inequality Gini in the US was about the same order of magnitude in 1983 as in 1776.[8] I confirm here that the family farm measure from earlier dates since 1858 is a good predictor of inequality today (Table 2).

[8] There is also a big debate in the literature about recent trends in inequality in rich countries. One of the most recent entries in this literature is Brandolini and Smeeding (2005), who conclude that there is no common trend upward or downward in inequality in rich democracies over the past quarter century.

Table 2
Inequality measure regressed on share of family farms in different decades

Dependent variable: share of top quintile, 1960–98			
Right-hand side variable:	Coefficient on share of family farms	Observations	R-squared
FF1998	−0.08 (2.48)*	121	0.05
FF1988	−0.067 −1.76	107	0.03
FF1978	−0.099 (3.36)**	95	0.1
FF1968	−0.111 (4.10)**	94	0.13
FF1958	−0.191 (7.59)**	71	0.4
FF1948	−0.242 (7.43)**	62	0.43
FF1938	−0.266 (7.65)**	53	0.52
FF1928	−0.283 (6.64)**	53	0.51
FF1918	−0.278 (5.77)**	47	0.47
FF1908	−0.258 (5.50)**	44	0.41
FF1898	−0.265 (5.03)**	40	0.39
FF1888	−0.264 (5.29)**	40	0.38
FF1878	−0.237 (5.19)**	39	0.37
FF1868	−0.215 (4.95)**	37	0.3
FF1858	−0.222 (4.39)**	35	0.28

Robust *t* statistics in parentheses, * significant at 5%; ** significant at 1%.
FF*xxxx* is share of family farms in agricultural land in year *xxxx*; source: Vanhanen (in press).

The relationship weakens again in the more recent data, probably for the same reasons as the weaker relationship with the wheat–sugar endowments.

2.2. Basic results on inequality and development outcomes

With these preliminaries, the next step is to assess the effect of inequality on development outcomes using the wheat–sugar ratio as an instrument for inequality. The first stage regression shows a highly significant relationship between the wheat–sugar endowment ratio and the two measures of inequality.

The F-statistics for the first stage regressions are well above the critical values identified by Stock and Yogo (2002) as indicating a problem with weak instruments. It is also above the earlier rule of thumb suggested by Staiger and Stock (1997): that the F-statistic in the first stage regression exceed 10 (Table 3).

Table 3
First stage regression for inequality on wheat–sugar ratio

Dependent variables	Average adjusted Gini, 1960–98	Average adjusted share of income accruing to top quintile, 1960–98
lwheatsugar	−18.328	−19.133
	(5.59)**	(6.39)**
Constant	44.555	49.275
	(48.26)**	(61.75)**
Observations	118	114
F-statistic	23.64	30.86
R-squared	0.17	0.22

Robust *t* statistics in parentheses.
** significant at 1%.

Next is the estimation of the direct relationship between inequality and income, institutions, and schooling. The measure of institutions is the comprehensive indicator developed by Kaufmann, Kraay, and Zoido-Lobaton 2003 (KKZ). This measure summarizes the information contained in more than 300 indicators of institutional quality using a particular method of unobserved components, correcting for selection bias. They derive six indicators of institutional quality: government efficiency, corruption, political instability, regulatory burden, rule of law, and democracy. I average over their six measures to derive a single indicator of institutional quality (KKZ2002), although I will also test each component separately. The measure of schooling comes from secondary enrollment rates averaged over 1998–2003 from the World Bank World Development Indicators (SEC9803). The measure of level of development is per capita income in 2002 from Summers and Heston, 1991, updated to 2002 using World Bank World Development Indicator growth rates (lgpdppc).

Table 4 shows that inequality predicts a lower level of development, worse institutions, and a lower level of schooling. The magnitude of the relationships is higher in instrumental variables than in OLS, suggesting that the causal effect of inequality on development outcomes is actually understated by the OLS relationship.

Table 4 further expands on the basic result by adding two quick robustness checks. The first excludes the Western Hemisphere, to which Engerman and Sokoloff's original case study was limited. The prediction that inequality inhibits development with the wheat–sugar ratio as an instrument holds "out of sample" for the rest of the world.

Second, I include regional dummy variables. This requires a little care about how regions are defined. The conventional choice for regional dummies – the World Bank's regional classifications – is endogenous because the regions themselves are defined on the basis of per capita income. First, of course, rich countries are excluded from the regions of the World Bank's "developing countries". I correct this by including Japan, Australia, and New Zealand back into East Asia and Pacific, Western Europe back into the Europe and Central Asia region, the US and Canada back into the Latin America and Caribbean region, etc. Second, some breakdowns of regions by the World Bank are done by per capita income: low income South Asia is separated from middle-income East Asia and Pacific, and middle-income North Africa (also including the Middle East in the World Bank) is delineated from low-income sub-Saharan Africa. I address this by combining those regions that were split because of income. So I have 4 regions: (1) East/South Asia and Pacific, (2) Western Hemisphere, (3)

Table 4
Basic results for development outcomes and inequality: Ordinary least squares and instrumental variables

Regression	Dependent variable: log per capita income, 2002 (lgdppc)							
	Inequality measure: Gini coefficient, 1960–98				Inequality measure: share of top quintile, 1960–98			
	OLS	IV	IV excluding Americas	IV	OLS	IV	IV excluding Americas	IV
Inequality measure	−0.040	−0.121	−0.15	−0.126	−0.043	−0.127	−0.157	−0.143
	(4.27)**	(4.45)**	(3.60)**	(2.43)*	(4.56)**	(4.30)**	(3.53)**	(2.37)*
East and South Asia and Pacific				12.54				14.068
				(6.28)**				(5.24)**
Americas				13.926				15.428
				(5.83)**				(4.98)**
Europe and Central Asia				13.349				14.677
				(7.03)**				(5.86)**
Middle East and Africa				13.053				14.499
				(5.44)**				(4.74)**
Observations	107	97	74	97	106	96	73	96
R-squared	0.13				0.14			
F-statistics from first stage		21.2	15.4	8.8		25.6	18.9	9.1
	Dependent variable: Kaufmann, Kraay, and Zoido-Lobaton Institutions Index, 2002 (kkz2002)							
Inequality measure	−0.031	−0.091	−0.109	−0.123	−0.037	−0.098	−0.113	−0.148
	(4.92)**	(4.53)**	(3.68)**	(2.77)**	(5.87)**	(4.84)**	(4.00)**	(2.58)*
East and South Asia and Pacific				4.652				6.517
				(2.72)**				(2.56)*
Americas				5.811				7.652
				(2.80)**				(2.59)*
Europe and Central Asia				5.04				6.614
				(3.03)**				(2.81)**
Middle East and Africa				5.487				7.316
				(2.62)**				(2.48)*
Constant	1.406	3.91	4.544		1.834	4.658	5.281	
	(4.65)**	(4.58)**	(3.77)**		(5.71)**	(4.86)**	(4.06)**	
Observations	128	118	95	118	124	114	91	114
R-squared	0.13				0.17			
F-statistics from first stage		23.6	16.4	10.4		30.9	22.8	9.9
	Dependent variable: secondary enrollment rate, average 1998–2002 (sec9802)							
Inequality measure	−1.474	−4.891	−6.259	−4.428	−1.721	−4.795	−6.005	−5.349
	(5.05)**	(5.05)**	(4.08)**	(2.78)**	(5.55)**	(5.43)**	(4.49)**	(2.55)*
East and South Asia and Pacific				236.66				305.335
				(3.83)**				(3.25)**
Americas				280.382				348.398
				(3.84)**				(3.25)**
Europe and Central Asia				266.006				321.505
				(4.44)**				(3.72)**
Middle East and Africa				250.896				318.545
				(3.37)**				(2.96)**
Observations	120	113	91	113	117	110	88	110
R-squared	0.14				0.16			
F-statistics from first stage		21.7	15.5	9.6		28.3	21.0	8.2

Robust *t* statistics in parentheses (* significant at 5%; ** significant at 1%). Constants (not shown) included in all regressions except for those with regional dummies.

Table 5
Magnitude of effect on development of change in inequality

Dependent variable:	Coefficient on Gini in IV regression (for whole sample, without regional dummies)	Change in dependent variable in response to 1 standard deviation change in Gini	Ratio to 1 standard deviation dependent variable
Log income per capita, 2002	−0.121	−1.09	−1.09
Kaufmann–Kraay index of institutions, 2002	−0.091	−0.82	−1.04
Secondary enrollment rate, average 1998–2002	−4.891	−44.03	−1.27

Europe and Central Asia, and (4) Middle East and Africa. Although the F-statistics on the first-stage regression on the excluded instrument are a little weak, the results on inequality are robust to including dummies for these 4 regions (Table 4).

How much does inequality matter as a determinant of development? A one standard deviation increase in the Gini (9 percentage points) reduces income by 1.1 standard deviations, institutional quality by 1.0 standard deviations, and schooling by 1.3 standard deviations (Table 5). The amount by which inequality hinders development is economically meaningful as well as statistically significant.

The previous literature stressed institutions as an important channel that affects both level of development and schooling. Engerman and Sokoloff stressed suffrage and democracy as affecting both of the other outcomes. Hence, I look into the institutional quality variable in more detail. Analogously to the exercise performed by Kaufmann et al. (1999a,b), I estimate the equations from Table 4 using the six different measures of institutional quality one at a time (IV results shown). Note that Kaufmann et al. (1999a,b) formulate these six measures in such a way that they all are distributed Normal (0,1), so the coefficients on institutions are directly comparable.

The results (Table 6) do not show much discrimination in how inequality affects different types of institutions. This may be because democracy is the fundamental that affects all the other institutional variables, because a dominant elite worsens institutions on all dimensions, or conceivably because the KKZ measures are unsuccessful in separating out different characteristics of institutions.

2.3. Robustness checks for omitted variables

As suggested in the introduction, some plausible competing alternatives (not necessarily exclusive) to the inequality hypothesis are ethnic fractionalization, legal origins, and tropical location. The approach here is to control for each of these in turn, taking each one as exogenous, while continuing to run an IV regression of development outcomes on the inequality measures with the wheat–sugar endowment ratio as an instrument.

Ethnic fractionalization (taken from Alesina et al., 2003, where it is a measure of both race and language in recent years) is often a significant determinant of development outcomes (Table 7). The coefficient on inequality drops modestly when controlling for ethnic fractionalization, but it is still highly significant. The first stage results on the differential explanatory power of the instrument are more than satisfactory (see F-statistics in Table 7). Comparing the results to a regression where ethnic fractionalization is the only right-hand-side variable, we see that

Table 6
Institutions IV results on inequality by kind of institution (measured in 2002 by Kaufmann, Kraay, and Zoido-Lobaton)

Dependent variables →	Voice and accountability	Rule of law	Freedom from corruption	Political stability and violence	Regulatory quality	Government effectiveness
Gini coefficient	−0.107	−0.123	−0.121	−0.099	−0.103	−0.122
	(4.21)**	(4.56)**	(4.40)**	(4.33)**	(3.99)**	(4.56)**
Constant	4.587	5.208	5.105	4.112	4.435	5.206
	(4.30)**	(4.53)**	(4.34)**	(4.35)**	(4.04)**	(4.54)**
Observations	118	118	118	118	118	118
Share of top quintile	−0.111	−0.132	−0.128	−0.107	−0.111	−0.131
	(4.45)**	(4.87)**	(4.57)**	(4.82)**	(4.34)**	(4.82)**
Constant	5.292	6.257	6.063	5.009	5.35	6.233
	(4.49)**	(4.81)**	(4.48)**	(4.86)**	(4.38)**	(4.78)**
Observations	114	114	114	114	114	114

Robust *t* statistics in parentheses.
* significant at 5%; ** significant at 1%.

controlling for inequality reduces by about half the magnitude of the relationship between ethnic fractionalization and development.

Introducing dummies for British (leg_british), French (leg_french), and Socialist legal origin (leg_socialist) (where German or Scandinavian legal origin are the omitted categories) also leaves the significance of inequality unchanged. In fact, the magnitude of the inequality effect increases controlling for legal origin. Compared to a regression that features only the legal origin dummies, the introduction of inequality (instrumenting for inequality as earlier) renders British and French legal origin insignificant (both the coefficient and standard error change considerably). I do not take these results as a major commentary on the large legal origin literature, which would clearly require more exploration, but they do show that the inequality hypothesis survives when compared to the alternative legal origin hypothesis. Socialist legal origin remains significant in the regression including inequality, but inequality also remains significant. The *F*-statistics on the

Table 7
Robustness checks: effect of inequality on development outcomes controlling for ethnic fractionalization

Dependent variables →	Inequality measure: Gini, 1960–98			Inequality measure: share of top quintile, 1960–98			Ordinary least squares omitting inequality measures		
	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802
Inequality measure	−0.10	−0.08	−3.89	−0.10	−0.08	−3.42			
	(3.10)**	(3.36)**	(3.81)**	(3.00)**	(3.62)**	(4.05)**			
Ethnic	−0.78	−0.61	−37.71	−1.13	−0.78	−51.07	−2.02	−1.43	−74.86
fractionalization	−1.31	−1.55	(1.98)*	(2.34)*	(2.37)*	(3.45)**	(6.56)**	(6.35)**	(6.86)**
Constant	12.52	3.55	251.98	12.89	4.04	253.45	8.79	0.69	103.67
	(10.29)**	(4.06)**	(6.62)**	(9.19)**	(4.26)**	(6.97)**	(56.20)**	(5.34)**	(18.92)**
Obser vations	97	118	113	96	114	110	106	127	120
R-squared							0.26	0.20	0.28
F-statistics for first-stage on excluded instrument	14.5	20.47	17.75	19.28	29.42	27.21			

Robust *t* statistics in parentheses.
* significant at 5%; ** significant at 1%.

Table 8
Robustness checks: Inequality controlling for legal origin

Dependent variables →	Inequality measure: Gini, 1960–98			Inequality measure: Share of top quintile, 1960–98			Ordinary least squares omitting inequality		
	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802
Inequality measure	−0.20	−0.16	−7.54	−0.19	−0.15	−6.72			
	(2.99)**	(3.20)**	(2.88)**	(3.74)**	(4.12)**	(3.85)**			
leg_british	0.66	0.43	33.68	0.02	−0.02	10.65	−1.35	−1.17	−45.84
	(0.78)	(0.68)	(1.03)	(0.03)	(0.04)	(0.54)	(4.94)**	(6.72)**	(5.15)**
leg_french	0.71	0.35	29.41	0.22	0.04	14.11	−1.39	−1.35	−49.01
	(1.01)	(0.64)	(1.08)	(0.49)	(0.10)	(0.80)	(5.56)**	(8.97)**	(6.20)**
leg_socialist	−1.44	−1.08	−12.00	−1.86	−1.39	−29.44	−1.35	−1.55	−33.81
	(2.43)*	(3.15)**	(0.73)	(3.86)**	(5.60)**	(2.48)*	(5.00)**	(9.29)**	(4.48)**
Constant	16.03	6.78	372.35	16.74	7.17	384.56	9.17	1.31	112.65
	(6.86)**	(3.91)**	(4.09)**	(8.15)**	(4.97)**	(5.39)**	(44.27)**	(11.61)**	(18.48)**
Observations	96	114	110	95	112	108	104	122	116
R-squared							0.13	0.22	0.14
F-statistics on first stage for excluded instrument	7.87	8.42	7.02	14.51	15.69	13.66			

Robust *t* statistics in parentheses; * significant at 5%; ** significant at 1%.
Source for legal origin data: La Porta et al. (1998).

first stage regression with the instrument are a little weak for the Gini coefficient regressions, but acceptable for the regressions with share of top quintile (Table 8).

The tropics measure is the measure introduced by Sachs and coauthors: the share of the country's cultivated land area in tropical climate zones (hot and humid with no winter, which is the most precise measure of tropical conditions).[9] This robustness check is particularly important as the wheat–sugar ratio could be proxying for location in the tropics — after all tropical conditions are a major determinant of whether you can grow wheat (no) or sugarcane (yes). However, the correlation is not exact, so we can examine whether the inequality results survive when we independently control for tropics. The answer is yes, and the tropics variable is not significant except in one of the schooling regressions. The differential explanatory power of the instrument in the first stage regression also survives intact. In contrast, both the magnitude of the coefficient on tropics and its significance is drastically altered by controlling for inequality (compare last columns to previous ones in Table 9).

2.4. The exclusion restriction

One of the most problematic parts of any IV exercise is the exclusion restriction that the instrument does not affect the second stage left-hand-side variable directly (including through any non-inequality variable that does affect the LHS variable). How plausible is it that the wheat–sugar endowment does not directly affect level of development, schooling, and institutions, other than through its effect on inequality? There are two ways to address this question, although both of them are only partially satisfactory: a priori intuition and econometric testing.

To make the problem worse, if the exclusion restriction fails in the schooling or institutions regressions, this will create identification problems for the output regression, since schooling or

[9] The data are from the Center for International Development at Harvard. The exact measure is share of cultivated land in Koppen–Geiger climate zones A and B.

Table 9
Robustness checks: Effect of inequality on development outcomes controlling for share of tropical land

Dependent variables →	Inequality measure: Gini, 1960–98			Inequality measure: Share of top quintile, 1960–98			Ordinary least squares omitting inequality measures		
	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802
Inequality measure	−0.11	−0.08	−3.58	−0.10	−0.08	−3.29			
	(2.38)*	(2.68)**	(2.76)**	(2.58)*	(3.07)**	(3.02)**			
Share of tropical land	−0.24	−0.18	−19.12	−0.42	−0.29	−22.44	−0.94	−0.69	−39.36
	−0.54	−0.60	−1.61	−1.18	−1.17	(2.19)*	(4.37)**	(4.63)**	(5.66)**
Constant	12.42	3.60	228.04	12.66	3.86	232.52	8.20	0.27	83.10
	(6.93)**	(2.86)**	(4.33)**	(7.26)**	(3.30)**	(4.68)**	(62.29)**	(2.82)**	(21.89)**
Observations	95	116	111	95	113	109	100	121	114
R-squared							0.15	0.13	0.20
F-statistics on first stage for excluded instrument	10.5	10.5	14.51	16.74	22.81	23.09			

Absolute value of *t* statistics in parentheses, * significant at 5%; ** significant at 1%.
Source for share of tropical land: Sachs and Warner, 1997.

institutions affect output. One way of dealing with this at least for schooling is to test the effect of inequality on total factor productivity (as reported for 1988 by Hall and Jones, 1999), which purges the effect of human capital on output. Table 10 below shows that inequality continues to be significant in the productivity regressions.

Another a priori problem that must be addressed is that wheat and sugar might have direct income effects through production. The theory of comparative advantage only partially mitigates this concern — it should not matter whether you have an advantage at producing one good or the other, because you can always specialize in what you are good at and trade for the other good. However, there may be wealth effects of good wheat land or good sugar land, and one type might be more valuable than the other at whatever the world price turns out to be. Having said this, relative wheat–sugar wealth effects would seem fairly minor compared to the vast range of products that countries can potentially produce.

Another bit of intuition and previous empirics that may make the exclusion restriction problematic is the widespread idea of the "resource curse." According to the resource curse idea, commodity windfalls create bad political economy. Isham et al. (2005) provide the most recent survey of the literature. They also make a new empirical contribution that echoes the finding of this paper —

Table 10
Effect of inequality on log productivity in 1988 (log A) (from Hall and Jones, 1999)

Inequality measure	Gini, 1960–98	Share of top quintile, 1960–98
Dependent variable	Log A	Log A
Coefficient on Inequality measure	−0.06	−0.07
	(3.77)**	(3.55)**
Constant	10.72	11.32
	(14.62)**	(11.88)**
Observations	91	90
F-statistics on first stage for excluded instrument	31.18	32.02

Robust *t* statistics in parentheses.
* significant at 5%; ** significant at 1%.

Table 11
Robustness checks: effect of inequality on development outcomes controlling for commodity exporting dummy

Dependent variables →	Inequality measure: Gini, 1960–98			Inequality measure: Share of top quintile, 1960–98			Ordinary least squares omitting inequality measures		
	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802	lgdppc	kkz2002	sec9802
Inequality measure	−0.10	−0.08	−3.60	−0.10	−0.09	−3.71			
	(4.09)**	(4.24)**	(5.08)**	(3.83)**	(4.37)**	(5.06)**			
Dummy for commodity exporter	−0.78	−0.31	−32.83	−0.73	−0.24	−28.61	−1.08	−0.50	−37.54
	(2.98)**	(−1.51)	(3.61)**	(2.83)**	(−1.2)	(3.30)**	(5.92)**	(3.46)**	(5.56)**
Constant	12.12	3.48	231.50	12.88	4.30	252.40	8.18	0.19	80.52
	(12.37)**	(4.37)**	(7.88)**	(10.25)**	(4.50)**	(7.45)**	(78.92)**	(2.45)*	(24.88)**
Observations	97	118	113	96	114	110	107	128	120
R-squared							0.21	0.07	0.21
F-statistics on first stage for excluded instrument	24.91**	29.95**	28.11**	25.64**	33.57**	31.04**			

Robust t statistics in parentheses * significant at 5%; ** significant at 1%.
Source for Commodity Exporter dummy: Easterly 2001.

"point-source" commodity exports (such as sugarcane grown on plantations) are associated with worse institutions, and with worse recent growth, than "diffuse" commodity exports (such as wheat grown on family farms). They argue that income from point-source commodities is more easily captured by the state and elites than diffuse commodities, which leads to worse institutions (they mention inequality as one of the mechanisms, although they are not trying to test different mechanisms against each other). Isham et al. focus on recent experience and note that they are not testing the long run mechanisms; this paper complements theirs by focusing on the long run.

As long as the "resource curse" goes through inequality, then it is consistent with the approach of this paper. However, if it affects institutions and income directly through some other channel, then there is a problem with the exclusion restriction. Most of the political economy stories about the resource curse do stress the (mis)behavior of a rich elite (including an elite that got rich from appropriating commodity income either economically or politically), however, which makes one think the inequality and resource curse stories are consistent.

Despite these arguments, it is certainly conceivable that the resource curse operates through other channels than through inequality. One way to address this is to introduce a more general measure of the resource curse than the wheat–sugar ratio and see if the wheat–sugar instrument has enough differential explanatory power to discern an effect of inequality after controlling for this more general measure. The measure I choose is the dummy for commodity exporting from Easterly (2001). The wheat–sugar measure does much better than this measure at explaining inequality in the first stage regression (see the F-statistic in Table 11).[10] The commodity dummy is significant for income and schooling (although not for institutions) in the second-stage regression, but inequality remains significant (Table 11).

The usual econometric approach to identification questions is to run a test of overidentification. These tests are far from definitive, as "passing the test" just means failure to reject the exclusion restriction and the tests may have weak power. To run the test, we need an alternative instrument for inequality. The tropical variable described above is a good candidate, as used by this author in a previous paper. There is considerable consensus in the literature that the tropics variable affects

[10] In the earlier work I found the commodity dummy to be a good instrument, but here the wheat–sugar ration seems to do even better.

Table 12
Overidentification tests: two-stage least squares regressions of development outcomes on inequality with tropics instrument in addition to lwheatsugar

	lgdppc	kkz2002	sec9802
IV regressions on Gini coefficient			
Inequality	−0.123	−0.096	−4.933
	(3.91)**	(4.11)**	(4.15)**
Constant	13.119	4.117	279.786
	(9.65)**	(4.12)**	(5.53)**
Observations	95	116	111
overidentification tests *p*-values:			
Sargan $N*R$-squared	0.6142	0.5734	0.1815
Basmann test	0.6194	0.5778	0.184
IV Regressions on share of top quintile			
Inequality	−0.128	−0.098	−4.695
	(3.99)**	(4.50)**	(4.47)**
Constant	13.944	4.687	291.731
	(9.05)**	(4.52)**	(5.88)**
Observations	95	113	109
P-value of overid test			
Sargan $N*R$-squared	0.2936	0.2886	0.0639
Basmann test	0.2985	0.2926	0.0634

Absolute value of *t* statistics in parentheses.
* significant at 5%; ** significant at 1%.

income through social and political institutions rather than directly (this paper also failed to find any direct significant effect of tropics on income above).[11] For the tropical variable to be of use here, its effects on institutions also must go through inequality rather than through any other mechanism. This is potentially problematic, but it is consistent with most stories in the literature that stress it is the rich elites who are adopting "extractive strategies" in tropical places.

The results on the over-identification tests do fail to reject the exclusion restriction, by a considerable margin in all of the regressions except one (Table 12). The problematic one is the equation for schooling using the top quintile measure for inequality: the test would reject the exclusion restriction at the 10% level, which makes for a weak spot in the results on human capital and inequality. As mentioned before, this could also imply problems for the output regression (which is a function of schooling); however, recall that the productivity regression still found a causal effect of inequality (and easily passes overidentification tests analogous to those discussed here). In all the other regressions, the margin by which the test fails to reject is large. So, subject to the usual serious caveats, the data provide no evidence in five out of the six regressions that the wheat–sugar endowment affects development outcomes by any other channel than through inequality.

3. Conclusions

This paper suggests that the conflicting results in the literature on inequality and growth are missing the big picture on inequality and long-run economic development. Consistent with the provocative hypothesis of Engermann and Sokoloff (1997) and Sokoloff and Engerman (2000), this paper supports the prediction that agricultural endowments – specifically the relative

[11] See for example Acemoglu et al. (2005a,b), Easterly and Levine (2003), and Rodrik et al. (2004).

abundance land suitable for wheat to that suitable for sugarcane – predict structural inequality and that structural inequality predicts development outcomes. The failure to reject the overidentifying restrictions in the system is subject to considerable caveats about the power of such tests and is problematic in one regression. However, it otherwise fails to find evidence that the wheat–sugar land ratio has any other effect on underdevelopment other than through inequality. The identification problem of establishing causality from inequality to development outcomes is unlikely to be regarded as completely resolved in any cross-country data exercise, including this one, but the results in this paper support a well-defined a priori hypothesis in which inequality caused underdevelopment.

This paper thus confirms the ES hypothesis on the mechanisms – institutions and schooling – by which higher inequality hinders development. While also finding evidence consistent with other development fundamentals, the paper finds high structural inequality to be a large and statistically significant hindrance to developing the mechanisms by which economic development is achieved. This paper argues that the previous literature has missed the big picture — inequality does cause underdevelopment.

Appendix A. LWHEATSUGAR by country

Algeria	0.0404	Greece	0.2231	Norway	0.0535
Argentina	0.2895	Guatemala	−0.3314	Pakistan	0.1462
Armenia	0.1120	Guinea	−0.0035	Panama	−0.1036
Australia	0.1347	Guyana	−0.0997	Papua New Guinea	−0.0431
Austria	0.4380	Honduras	−0.1246	Paraguay	−0.1519
Azerbaijan	0.0877	Hungary	0.4383	Peru	−0.0979
Bangladesh	0.1280	India	−0.0045	Philippines	−0.2045
Belarus	0.4833	Indonesia	−0.0454	Poland	0.3491
Belgium	0.4392	Iraq	0.1628	Portugal	0.3409
Bolivia	−0.1195	Ireland	0.1005	Romania	0.3268
Bosnia-Herzegovina	0.5281	Israel	0.2877	Russia	0.3002
Botswana	0.0088	Italy	0.3287	Rwanda	−0.0027
Brazil	−0.0491	Ivory Coast	−0.0428	Senegal	0.0000
Bulgaria	0.4086	Jamaica	−0.3926	Serbia	0.3944
Burkina Faso	0.0000	Japan	0.2908	Sierra Leone	−0.0096
Burundi	0.0110	Jordan	0.0071	Slovenia	0.4173
Cambodia	−0.0201	Kazakhstan	0.0129	South Africa	0.1088
Canada	0.1019	Kenya	0.1298	Spain	0.0649
Cent. Afr. Rep.	−0.0407	Korea, South	0.2493	Sri Lanka	−0.0565
Chad	0.0000	Kyrgyzstan	0.0104	Sudan	−0.0025
Chile	0.2481	Laos	−0.0497	Suriname	−0.1921
China	0.0850	Latvia	0.4253	Swaziland	0.0719
Colombia	−0.0946	Lebanon	0.1190	Sweden	0.1777
Costa Rica	−0.1385	Lesotho	0.1342	Switzerland	0.5439
Czech Republic	0.4749	Lithuania	0.4986	Tanzania	0.0671
Denmark	0.4419	Macedonia	0.1828	Thailand	−0.0054
Dominican Republic	−0.2175	Madagascar	−0.0544	Tunisia	0.1173
Ecuador	−0.0257	Malaysia	−0.0889	Turkey	0.1601
Egypt	0.0000	Mali	0.0000	Turkmenistan	0.0000
El Salvador	−0.0138	Mauritania	0.0000	Uganda	−0.1508
Estonia	0.3529	Mexico	0.0047	Ukraine	0.3094
Ethiopia	0.1664	Moldova	0.1976	United Kingdom	0.3385
Fiji	−0.0961	Mongolia	0.0000	United States	0.3830

(continued on next page)

Appendix A (*continued*)

Finland	0.0206	Myanmar	0.0212	Uruguay	0.5775
France	0.4375	Nepal	0.0776	Venezuela	−0.0544
Gabon	−0.2017	Netherlands	0.3398	Vietnam	−0.0786
Gambia	0.0000	New Zealand	0.1234	Zambia	0.0508
Georgia	0.3854	Nicaragua	−0.1593	Zimbabwe	0.0084
Germany	0.4452	Niger	0.0000		
Ghana	−0.0078	Nigeria	−0.0048		

References

Abbott, George C., 1990. Sugar. Routledge, New York.

Acemoglu, Daron, 2005. The Form of Property Rights: Oligarchic vs. Democratic Societies, MIT Mimeo, April 2005.

Acemoglu, Daron, Johnson, Simon, Robinson, James, 2001. The colonial origins of comparative development. American Economic Review 91 (5), 1369–1401.

Acemoglu, Daron, Johnson, Simon, Robinson, James, 2002. Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution. Quarterly Journal of Economics, Vol. 117, 1231–1294.

Acemoglu, Daron, Johnson, Simon, Robinson, James, 2005a. Institutions as the fundamental determinant of long term growth. In: Aghion, Philippe, Durlauf, Steven (Eds.), Handbook of Economic Growth. Elsevier.

Acemoglu, Daron, Johnson, Simon, Robinson, James A., 2005b. "A Response to Albouy's 'A Reexamination Based on Improved Settler Mortality Data'," MIT (Economics Department), mimeo.

Albouy, David, 2006. The Colonial Origins of Comparative Development: A Reexamination Based on Improved Settler Mortality Data, mimeo, Berkeley, May 2006.

Alesina, Alberto, Rodrik, Dani, 1994. Distributive politics and economic growth. Quarterly Journal of Economics 108, 465–490.

Alesina, Alberto, Ozler, Sule, Roubini, Nouriel, Swagel, Phillip, 1996. Political instability and economic growth. Journal of Economic Growth 1 (2), 189–211 (June).

Alesina, Alberto, Baqir, Reza, Easterly, William, 1999. Public goods and ethnic divisons. Quarterly Journal of Economics CXIV (4), 1243–1284 (November).

Alesina, Alberto, Devleeschauwer, Arnaud, Easterly, William, Kurlat, Sergio, Wacziarg, Romain, 2003. Fractionalization. Journal of Economic Growth 8, 155–194.

Anand, Sudhir, Kanbur, S.M.R., 1993. Inequality and development: a critique. Journal of Development Economics 41, 19–43 (June).

Atkinson, A.B., Brandolini, A., 2001. Promises and pitfalls in the use of secondary data-sets: income inequality in OECD countries as a case study. Journal of Economic Literature 39 (3), 771–800.

Banerjee, Abhijit V., Duflo, Esther, 2003. Inequality and growth: what can the data say? Journal of Economic Growth 8 (3 Sep), 267–299.

Banerjee, Abhijit, Iyer, Lakshmi, 2005. History institutions and economic performance: the legacy of colonial land tenure systems in India. American Economic Review 95 (4), 1190–1213.

Banerjee, Abhijit V., Newman, Andrew F., 1993. Occupational choice and the process of development. Journal of Political Economy 101 (2), 274–298.

Barro, R.J., 2000. Inequality and Growth in a Panel of Countries. Journal of Economic Growth 5, 5–32.

Beck, Thorsten, Levine, Ross, Loayza, Norman, 2000. Finance and the sources of growth. Journal of Financial Economics 58, 261–300 (October).

Benabou, Roland, 1996. Inequality and Growth, NBER Macroeconomics Annual 1996. In: Bernanke, Ben S., Rotemberg, Julio (Eds.), MIT Press, Cambridge, pp. 11–74.

Birdsall, Nancy, Ross, David, Sabot, Richard, 1995. Inequality and growth reconsidered: lessons from east Asia. World Bank Economic Review 9 (3), 477–508 (September).

Bloom, David E., Sachs, Jeffrey D., 1998. Geography, demography, and economic growth in Africa. Brookings Papers on Economic Activity 2.

Blume, Helmut, 1985. Geography of Sugar Cane: Environmental, Structural, and Economical Aspects of Cane Sugar Production. Verlag Dr. Albert Bartens, Berlin.

Bourguignon, François, Verdier, Thierry, 2000. Oligarchy, democracy, inequality and growth. Journal of Development Economics 2 (62), 285–313.

Brandolini, Andrea, Smeeding, Timothy M., 2005. Patterns of Economic Inequality in Western Democracies: Some Facts on Levels and Trends, Bank of Italy and Syracuse University mimeo.
Clarke, George, 1995. More evidence on income distribution and growth. Journal of Development Economics 47, 403–427.
Deininger, Klaus, Squire, Lyn, 1996. A new data set measuring income inequality. World Bank Economic Review 10 (3), 565–591.
Deininger, Klaus, Squire, Lyn, 1998. New ways of looking at old issues: inequality and growth. Journal of Development Economics 57 (2), 259–287.
Easterlin, Richard A., 1981. Why isn't the whole world developed? Journal of Economic History 41 (1), 1–19 (March).
Easterly, William, 2001. The middle class consensus and economic development. Journal of Economic Growth 6 (4), 317–336 (December).
Easterly, William, Levine, Ross, 1997a. Africa's growth tragedy: policies and ethnic divisions. Quarterly Journal of Economics CXII (4), 1203–1250.
Easterly, William, Levine, Ross, 1997b. Tropics, germs, and crops: the role of endowments in economic development. Journal of Monetary Economics 50 (1) (January 2003).
Engermann, Stanley, Sokoloff, Kenneth, 1997. Factor endowments, institutions, and differential paths of growth among new world economies: a view from economic historians of the United States. In: Haber, Stephen (Ed.), How Latin America Fell Behind. Stanford University Press, Stanford CA.
Engerman, Stanley L., Sokoloff, Kenneth L, 2005. "The evolution of suffrage institutions in the Americas," Journal of Economic History 65 (4), 891–921.
Engerman, Stanley L., Mariscal, Elisa V., Sokoloff, Kenneth L., 2002. The Evolution of Schooling Institutions in the Americas, 1800–1925. Working Paper. University of California, Los Angeles.
Fernandez, Raquel, Rogerson, R., 2001. Sorting and long-run inequality. Quarterly Journal of Economics 116 (4), 1305–1341.
Fernandez, Raquel, Guner, Nezih, Knowles, John, 2005. Love and Money: A Theoretical and Empirical Analysis of Household Sorting and Inequality. Quarterly Journal of Economics 120 (1), 273–344.
Food and Agriculture Organization (FAO) of the United Nations, 2005. How Good the Earth? Quantifying land resources in developing countries-FAO's agro-ecological zones studies. Rome http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/T8300E/T8300E00.htm.
Forbes, Kristin, 2000. A reassessment of the relationship between inequality and growth. American Economic Review 90 (4), 869–887.
Galor, E., Moav, O., 2006. Das Human Kapital: a theory of the demise of the class structure. Review of Economic Studies 73 (1), 85–117.
Galor, Oded, Zeira, Joseph, 1993. Income distribution and macroeconomics. Review of Economic Studies 60, 35–52.
Galor, E., Moav, O., Vollrath, D., 2006. Land inequality and the emergence of human capital promoting institutions. Brown University Working Paper.
Glaeser, Edward, LaPorta, Rafael, Lopes-de-Silanes, Florencio, Shleifer, Andrei, 2004. Do institutions cause growth? Journal of Economic Growth 9 (3), 271–303.
Hall, Robert E., Jones, Charles L., 1999. Why do some countries produce so much more output per worker than others? Quarterly Journal of Economics 114 (1), 83–116.
Harlan, Jack R., 1992. Crops and Man. American Society of Agronomy, Madison WI.
Isham, Jonathan, Woolcock, Michael, Pritchett, Lant, Busby, Gwen, 2005. The varieties of resource experience: natural resource export structures and the political economy of economic growth. The World Bank Economic Review 19, 141–174.
Kaldor, Nicholas, 1956. Alternative theories of distribution. Review of Economic Studies 23, 94–100.
Kaldor, Nicholas, 1961. Capital accumulation and economic growth. In: Lutz, F.A., Hague, D.C. (Eds.), The Theory of Capital. St. Martin's Press, New York.
Kaufmann, Daniel, Kraay, Aart, Zoido-Lobatón, Pablo, 1999a. Aggregating governance indicators. World Bank Research Working Paper 2195.
Kaufmann, Daniel, Kraay, Aart, Zoido-Lobatón, Pablo, 1999b. Governance matters. World Bank Research Working Paper 2196.
Khan, B. Zorina, Sokoloff, Kenneth L., 2004. The innovation of patent systems in the nineteenth century: a comparative perspective, National Bureau of Economic Research, Working Paper.
Krueger, Anne O., 1968. Factor endowments and per capita income differences among countries. The Economic Journal 641–659.
La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, Vishny, Robert W., 1998. Law and finance. Journal of Political Economy 106 (6), 1113–1155 (December).

La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, Vishny, Robert, 1999. The quality of government. Journal of Law, Economics, and Organization 15, 222–279.

Levine, Ross, 1999. Law, finance, and economic growth. Journal of Financial Intermediation 8 (1/2), 36–67.

Levine, Ross, 2005. Law, endowments, and property rights. Journal of Economic Perspectives 19 (3), 61–88 (Summer).

Levine, Ross, Loayza, Norman, Beck, Thorsten, 2000. Financial intermediation and growth: causality and causes. Journal of Monetary Economics 46 (1), 31–77 (August).

Lindert, Peter, 2000. Three centuries of inequality in Britain and America. In: Atkinson, Anthony, Bourguignon, Francois (Eds.), Handbook of Income Distribution, vol. 1. Elsevier, Amsterdam.

Lindert, Peter, Williamson, Jeffrey, 2003. Does globalization make the world more unequal? In: Bordo, Michael D., Taylor, Alan M., Williamson, Jeffrey G. (Eds.), Globalization in Historical Perspective. University of Chicago Press for the NBER, Chicago, pp. 227–270.

Mankiw, Gregory N., 1995. The Growth of Nations. Brookings Papers on Economic Activity, Vol 1, 273–326.

Mankiw, N. Gregory, David Romer, David Weil, 1992. A Contribution to the Empirics of Economic Growth. The Quarterly Journal of Economics, Vol 107, No.2, 407–437.

Mauro, Paolo, 1995. Corruption and growth. Quarterly Journal of Economics 110 (3), 681–712.

Mitchell, Brian (Ed.), 2003. International Historical Statistics 1750–2000, 3 Volumes Covering Europe, The Americas, Africa, Asia and Oceania. Palgrave MacMillan, London.

Perotti, Roberto, 1996. Growth, income distribution, and democracy: what the data say. Journal of Economic Growth 1, 149–188.

Persson, Torsten, Tabellini, Guido, 1994. Is inequality harmful for growth? American Economic Review 84, 600–621.

Przeworski, Adam 2004. Institutions matter? Government and Opposition 39 (4), 527–540 (Autumn 2004).

Raghuram, Rajan, Zingales, G. Luigi, 2006. The Persistence of Underdevelopment: Institutions, Human Capital, or Constituencies? NBER Working Paper No. 12093 Issued in March 2006.

Ravallion, Martin, 1997. A note on Rati Ram's Test of the Kuznets hypothesis. Economic Development and Cultural Change 46 (1), 187–190 (October).

Rodrik, Dani, Subramanian, Arvind, Trebbi, Francesco, 2004. Institutions rule: the primacy of institutions over geography and integration in economic development. Journal of Economic Growth 9 (2), 131–165.

Sachs, Jeffrey, Warner, Andrew, 1997. Fundamental sources of long-run growth. American Economic Review Papers and Proceedings 87 (2), 184–188 (May).

Schultz, Theodore W., 1963. The Economic Value of Education. Columbia University Press, New York.

Sokoloff, Kenneth L., Engerman, Stanley L., 2000. Institutions, factor endowments, and paths of development in the New World. Journal of Economic Perspectives 14 (3), 217–232.

Sokoloff, Kenneth L., Zolt, Eric M., 2005. Inequality and the evolution of institutions of taxation: evidence from the economic history of the Americas, paper presented at NBER Workshop on Political Economy. November.

Staiger, D., Stock, J.H., 1997. Instrumental variables regression with weak instruments. Econometrica 65, 557–586.

Stock, James H., Yogo, Motohiro, 2002. Testing for weak instruments in linear IV Regression. Technical Working Paper 284. October (Revised 2004).

Summers, Robert, Heston, Alan, 1991. The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988, Quarterly Journal of Economics, May 1991, vol. 106, iss. 2, pp. 327–368.

Vanhanen, Tatu, in press. Democratization: A Comparative Analysis of 170 Countries. London: Routledge. Data and documentation available at http://www.fsd.uta.fi/english/data/catalogue/FSD1216/.

Woolcock, Michael, Pritchett, Lant, Isham, Jonathan, 2001. The social foundations of poor economic growth in resource-rich economies. In: Auty, R.M. (Ed.), Resource Abundance and Economic Development. UNU/WIDER Studies in Economic Development Economics. Oxford University Press.

World Bank, 1993. The East Asia Miracle. Oxford University Press.

World Bank, 2005. World Development Report 2006: Equity and Development. World Bank and Oxford University Press, Washington DC.

World Institute for Development Economics Research (WIDER), 2000, World Income Inequality Database, Version 1.0, User Guide and Data Sources.