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The Modern World:

The effect of democracy, colonialism and war on economic growth 1820-2000

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The paper uses the recently available data on growth rates, democracy, protectionism, and wars over the period 1820 to 2000 to look at the determinants of economic growth over the long-term. It is motivated by the following questions: what is the effect of democracy on growth, was colonialism economically bad for colonies, does protectionism affect growth negatively, what is the effect of wars? We find that own democracy has a significant positive impact on growth which increases as country's income goes up. (Overall level of democracy in the world however has no effect on growth.) The effect of colonialism is not statistically significant. Lower average level of protection in the world helps growth. Wars, whether civil or between the states, are strongly detrimental to economic growth.

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1. The objective

The paper has three objectives. First, to study the empirical relationship between economic growth and political variables, in particular democracy, over the entire period of what may called "the modern world" covering broadly the period from the end of Napoleonic wars in Europe until after the fall of the Berlin Wall and dissolution of the USSR.

Second, to look at the possible effects of colonization (and its reverse, decolonization) on both the colonies and the empires. Here we ask a question that was asked by many, namely did colonialism hamper faster development of the conquered countries and was imperialism beneficent for the metropolises?

Third, we look at level of protectionism in the world (average tariff rate) and its possible impact on growth over the long run.

The first two topics have been extensively researched and discussed. This was however done for a much shorter period of time (for example, the discussion of the relationship between growth rates and democracy was typically limited to the post- World War II period), or for only a few selected countries (e.g. studies of British colonial impact on Indian economic development). What distinguishes this work is that these questions are considered for the first time in a single framework (all of them simultaneously) and, most importantly, for a period of almost two centuries.

This paper is made possible by the remarkable recent progress in the availability of historic data series for economic, demographic, and political variables. Section 3 discusses at some length these new data sources. Section 2 reviews briefly some of the existing literature on the three topics mentioned above. Since the discussion of these topics has been conducted since the very inception of the modern world—that is, for almost two hundred years—we cannot but be very selective. The review is therefore simply meant to provide a few pointers to the reader, or to put the analysis which follows in context rather than to be exhaustive and do justice to the volumes that have been written on these issues. Section 4 presents the core part of the paper: the empirical investigation of these relationship for the period 1820-2000. Section 5 presents tentative conclusions.

2. Discussion of the issues: a selective review

We are motivated by the following questions.

> 1. In the last two centuries, have increases in democracy (holding countries constant) been associated with faster growth rates or not? Or more exactly, using long-term data, do we find that increases in democracy help growth?
>
> 2. Did empires grow faster because they controlled colonies or not? And the related question, was growth of colonies slowed because they lacked political independence or, differently, have they been able to increase their growth rate in absolute terms or in relative terms (compared to the rest of the world) since decolonization?

3. Are countries' growth rates helped by a less protectionist world climate? In other words, if we have a choice between a world characterized by high tariff rates and another one characterized by lower tariff rates, will countries, on average, grow faster under one regime than another?

We include also two subsidiary questions: what was over this period the effect of Communism on economic growth (in addition to the effect that it might have had through the democracy variable), and what is the effect on economic growth of being involved in wars and civil conflicts?

Democracy and growth. Consider first the relationship between democracy and economic growth. It has been extensively studied. One of the key problems studies had to address is the endogeneity of the relationship. In other words, not only is democracy likely to affect the tempo of growth, but the reverse, higher income level, makes it easier for democracy to emerge, or in a different twist, more likely to stick once it was achieved. [2] Therefore, the coefficient on the impact of democracy on growth is likely to be biased. A further problem has been the inability to find variables that would be good instruments for democracy, in the sense that all variables that are likely to be associated with democracy are also likely to be correlated with the error term in the growth regression (that is, to affect growth outcomes themselves). Given these constraints, there was nevertheless a significant number of papers that dealt with the relationship.

[2] The income-democracy relationship is often called the Lipset hypothesis. Przeworski (2004) argues against it: income does not bring along democracy. It is simply that democracy –if it emerges in a rich country—is more likely to stick there. Hence we are bound to observe the association between the two.

In an influential paper Przeworski and Limongi (1993) reviewed some twenty empirical studies published to date and found that the evidence as to whether democracy or authoritarianism helps growth was, in a cross-sectional framework, almost exactly equally divided. As many studies ruled in favor or one as in favor of another—with a fair number reporting a tie. Moreover, Przeworski and Limongi (1993, p. 60) noted that the preponderance of evidence in favor of authoritarianism had somewhat waned in the more recent studies. They speculated that some of it might have been due to the difference in the samples and years and some to the differences in perception of success and hence fashions: autocratic, "developmentalist" regimes were widely believed to be doing better than democracies in the 1960s and 1970s, but the perception has since reversed. According to Przeworski and Limongi, even if we uncover some regularities in the relationship between growth and democracy, it is likely to be spurious. It is the differences in the regime survival that explain the differences in growth outcomes that we observe. Authoritarian regimes are more likely to change (into democracies) if economic growth sputters. Hence the observed positive correlation between democracy and economic growth is likely to be due to the selection bias.

Perotti's (1996) extensive empirical paper investigates a number of connections between income distribution, political institutions and growth. The link between democracy and growth is twofold: a direct one, and an indirect one through the median voter hypothesis which implies that more unequal democracies would tend to engage in greater redistribution and thus to affect growth rate negatively. Democracy is defined as a dichotomous variable based on Judice and Taylor (1988) definition. The period covered is 1960-1985 and Perotti uses country averages over that

period. [3] Thus the analysis is clearly cross-sectional, rather limited in sample size (one observation per country for each of the variables), and presented in levels only. Perotti (1996, p. 165) finds both effects of democracy to be statistically undistinguishable from nil.[4]

Barro has used democracy as an explanatory variable in his growth regressions from quite early on, starting at least with his 1991 paper. He too finds democracy and growth to be uncorrelated in a multivariable regression setting. In a more recent paper that is mostly concerned with the relationship between inequality, openness, and growth within a panel of countries, Barro (2000) uses democracy as a control. [5] Not surprisingly, it comes out as statistically not significant (see p.12). The same result is reported by Levine and Renelt (1992, p. 950) in their sensitivity analysis of growth regression. They conclude that democracy is not robustly correlated with growth.[6]

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[3] For a critique of the type of data used in this approach (not limited to Perotti of course) see Milanovic (2000).

[4] Perotti (p. 164-5) does argue that within democracies (that is, when the sample is split in democracies and non-democracies), the median voter hypothesis holds. But obviously this issue concerns the validity of the median voter hypothesis, not whether democracies have a different growth experience than non-democracies. To investigate the latter, one needs a sample where both are represented.

[5] It is not exactly clear what the definition of democracy is. Barro (2000, p.111) cryptically mentions that it is "a subjective index of…(electoral rights)." A more detailed definition is promised to exist on the Websites whose URL are not given. An Internet search discovered the Barro-Lee education data set, and some old definitions of political variables but no definition of democracy. By analogy with other Barro's work, however, one would guess that this is the Gastil index later taken over and updated annually by the Freedom House.

[6] The result is obtained from a single cross-section of some 100 countries using averages between 1960 and 1989. The number of observations in the "early" literature is very small. Levine and Renalt's (1992) influential sensitivity analysis is based on one hundred or fewer observations!

Tavares and Wacziarg (2001) take a more comprehensive view of the role of democracy. Since their empirical approach is probably the most complete it is worth explaining in somewhat greater detail. They argue that democracy is a multi-faceted phenomenon, and as such unlikely to affect growth through a single channel and directly. Rather it should affect growth through a multitude of channels—that is, indirectly. Empirically, it requires a more complicated structure: first, one has to identify the determinants of growth, and second to see whether these determinants are in turn affected by democracy. Consequently, a system of simultaneous equations needs to be solved. Tavares and Wacziarg identify four operative (in the sense that they are statistically significant) channels: education, inequality, public expenditures and capital accumulation.

In a usual cross-country level panel setting (65 industrial and developing countries over the period 1970-1989 using five-year averages), they provide two specifications: seemingly unrelated regressions (SURE) where the same set of exogenous regressors is supposed to affect different dependent variables (education, inequality etc.) which then in turn affect growth, and an IV-GLS approach where they instrument for endogenous variables.[7] [8] They create their own

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[7] It is instructive to look at their exogenous variables: population, various geographical and semi-geographic variables (e.g. dummy for oil exporters), ethnolinguistic fractionalization, political status of the country (independent, colony).

[8] The sample size should ideally be 260 (65 countries times 4 five-year periods) but is in reality much smaller (only 65) due to the lack of complete dataset for a number of variables. The fact that the system is extremely complex and requires a lot of instruments and controls does not help.

binary democracy index based on Freedom House data. They find that growth is positively affected by education and capital accumulation which, in turn, are differently influenced by democracy. The first is increased, the latter decreased. It thus quickly emerges that democracy is unlikely to have an unambiguous effect on growth. In the same vein, they find that growth is positively affected by lower inequality and negatively by higher government spending. Yet again, democracy helps growth on the one hand by reducing inequality but hampers it by increasing government spending. These are the four statistically significant effects which we mentioned above: two positive, two negative. On balance they yield an overall negative effect of democracy on growth (mostly on account of lower capital accumulation).

The results essentially carry-over in a fixed-effects framework although both the size and the significance of the coefficients are less, and in particular lower capital accumulation is no longer significantly associated with democracy. The outcome is that the total effect now is not statistically different from zero. Nevertheless, Tavares and Wacziarg tend to credit more the cross-sectional results and they conclude that democracy tends to be more responsive to the needs of the poorer sections of the population. This leads to increased education achievement and lower income inequality, but their positive effect on growth is more than offset by the slowdown in capital accumulation. They conclude that, based on the narrow economic grounds, it is difficult to make a case for a positive effect of democracy.

One of the key critiques of the studies that looked at the relationship between democracy and growth is that many of them are

based on cross-sectional data only where most of the identification (or even all of it) comes from between-country differences. Since democracy, growth and a number of other relevant variables may be jointly determined, the results are likely to suffer from endogeneity and the approach fails to answer the question of how democratization affects growth performance of a given country. To address this point, Rodrik and Wacziarg (2004) look at the instances of significant democratizations. [9] A significant democratization is defined as an increase of at least 3 points in the *polity2* variable. *Polity2* variable (from Polity IV database) is defined as level of democracy (ranging between 0 and 10) minus level of autocracy (ranging also from 0 to 10). The variable thus takes values between − 10 (most autocratic regime) to + 10 (most democratic). Rodrik and Wacziarg distinguish between the new democracies (countries within the first five years after a significant democratization) and established democracies (countries that have sustained significant democratization for more than five years). In a two-way fixed effects models that controls both for country- and time-effects, they find that the coefficient on new democracies is positive and significant and estimate the effect on per capita rate of growth to be 0.87 percent p.a. (all regressions are estimated annually). Moreover, they find that the effect is stronger for new democracies while it is statistically not different from zero for more established democracies. The effect carries through even when investigated in smaller samples, e.g. on the sample or low income or African countries alone. Therefore Rodrik and Wacziarg conclude that

[9] An earlier paper using the same approach and obtaining the same results was that by Shen (2002).

democratization—within a country—generally tends to have a positive impact on growth.

Finally, Persson (2004) argues that the failure to uncover the effect of democracy on growth is due to the use of too blunt a measure of democracy—in almost all cases a simple binary measure. He believes that the type of democracy is more important and introduces a variable to distinguish parliamentary vs. presidential and proportional vs. majoritarian political systems. In a panel setting (period 1960-2000 using Penn World Tables data for up to 140 countries) he finds that parliamentary and proportional systems outperform the other two.[10] However these results are obtained when regressions are run across the sample of democracies only (the latter being defined as country/years with the positive value of *polity2* variable) and do not address the difference between democracies and non-democracies.[11]

Colonialism and growth. On the subject of colonialism, and its economic benefits or costs, there is an inexhaustible literature. We would thus have to be extremely selective. There is, it seems, little doubt that the relations between colonies and metropolises were unequal and were structured, at least in principle, to the benefit of the latter. Bairoch (1997, vol. 2: 665-669, 647-8) has termed this unequal deal the "colonial

[10] The regressions are two-way fixed effects including year and country dummies. The data are annual and contemporaneous.

[11] Persson's approach, like the one of Tavares and Wacziarg, also relies on two steps. First, Persson investigates the effect of the type of democracy on two structural policies (approximated by openness, that is, trade/GDP ratio, and protection of property rights) and then the impact of these structural policies on output per worker. The latter impact is elusive (see Persson, 2004, p. 18-19).

contract." It contained the following four elements: (i) colonies can import only products from the metropolis and tariff rates must be low, normally zero percent, (ii) colonial exports can be made to the metropolis only from which they could be reexported, (iii) production of manufactured goods that can compete with the products of the metropolis is banned, and (iv) transport between colony and metropolis is conducted only on metropolis' ships. Economic policy of the colonies (to the extent that there was any independent economic policy) was therefore entirely subjugated to the interests of the metropolis, the most important objective being to prevent industrial competition from the colony. According to Bairoch, the "colonial contract" was the main cause of non-transmission of industrial revolution outside Europe.

In addition, other forms of exploitation were used, as illustrated by the "cultivation system" in Indonesia where exorbitant land taxes had to be defrayed by what was effectively a tribute: forced deliveries of crops, or forced labor (see Maddison, 2001, p. 86). As Maddison mentions, monopoly was another route to exploitation. Thus, all Indonesia's export trade was conducted using the ships owned by the Dutch King. Hochschild (1999) compared similar forced labor techniques introduced by Belgians in the Congo to the Gulag system in the Soviet Union, Both of course entailed huge human losses. The situation was not too different in other colonies or with other colonial powers, although there were obviously differences in the level of exploitation across time and place. Maddison (2001) has used the concept of "colonial drain", defined as the trade surplus run by the colony in its relationship with the metropolis, as an indicator of the unpaid flow of resources to the advantage of the metropolis. (The concept itself assumes that the surplus does not lead to

any offsetting financial benefit to the colony—that is, the colony does not gain a financial claim on the metropolis). Maddison's (2001, p. 87) estimates suggest an extremely high drain ranging between 7 and 10 percent of Indonesia GDI between 1868 and 1930. This may be considered an upper limit since Dutch colonialism was often thought to have been the most "efficient' in these terms. Similar calculations (Maddison, 2001, p. 87) show the drain from India to Great Britain over the same period to have averaged about 1 percent of GDI. [12] But whatever the amount, the important thing for us here is to see that there are both theoretical reasons and indeed empirical evidence that colonialism was associated with either outright exploitation of colonies or economic policies that disregarded colonies' interests. [13]

This last point has been strongly argued by Bairoch (1997). But while Bairoch views colonialism as having been economically detrimental to the colonies, he does not consider the resource transfers to have been the chief culprit. The cause, according to Bairoch, was that the relations between the two sides were structured to be inimical to the industrialization of the (future) Third World. The main reason was the need of the rich world to ensure easy markets for its industrial products.

[12] The issue is still alive; see for example a recent paper by Hatekar and Donge (2005) who argue that the structural break in India's growth occurred in 1950-52, just after independence not, as some authors have suggested, with economic liberalization in 1980-81.

[13] Another advantage of having colonies—although this one not linked to unequal trade—was that the expansion of food production in colonies reduced the pressure on European rents and also permitted lower wages (since wage goods were cheaper than they would have been otherwise). In a recent econometric simulation of the role of (what is called) "ghost acreages" van Zanden (2005, p.27) estimates that their contribution at the peak might have amounted to as much as 10 percent of Dutch GDI.

To do so the metropolises needed to nip in the bud any attempt at local competition. Bairoch argues that it was not accidental that the only non-Western 19th century attempts at industrialization, whether ultimately successful or failed, were started in the countries that were independent: Mohammed Ali's Egypt, Japan in the Meiji era, and King Radama's Madagascar. But while, according to Bairoch, colonialism was responsible for the failure of the rest of the world to benefit from technological revolution, the rest of the world was only of marginal importance for the West's 19th century success. Bairoch (1989) illustrates this by showing that both in exports and imports, the role of trade with Asia, Africa and Latin America remained marginal for the key West European nations. West's growth was therefore self-propelled, and the failure of the Rest was not the cause of West's success.

The view that colonialism was economically harmful to colonies while not beneficial to the West, or not an explanation for its take-off, will be called the Bairoch hypothesis.[14] The hypothesis can be readily interpreted in econometric terms. We would expect to find colonialism to have been associated with negative effects on the growth of colonies, and with no effect on the growth of the metropolises. In contrast, those like Samir Amin (see Amin, 1970, p. 152) or William McNeill (1982) who hold the view that colonialism was beneficent to the metropolises would argue

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[14] " …I hasten to insist on the fact that if colonialism did not play an important role in explaining why ' we [the West] became rich', it played a crucial role in explaining why ' they [the Third World] remained poor' and even why, at a certain stage of history, ' they became poorer.' And among the many causes of such an evolution is what I call compulsory economic liberalism of the future Third World economies." (Bairoch, 1989, p. 238).

that we should expect to find the opposite signs in the growth regressions for the two sets of countries: negative for the colonies, positive for the empires.[15] A final possibility is the one hinted by Hobson, namely that colonialism was economically harmful both to the rulers and to the ruled.[16] In that case, the sign in the regressions should be negative both for colonies and empires. For simplicity, we can call it the Hobson hypothesis.

Colonialism was not much used in empirical work on growth except in a rather superficial way where dummy variables are assigned to various countries depending on whether they were colonies, and if so whose colonies. This was done to instrument institutions which in turn are supposed to affect growth (see Acemoglu, Johnson and Robinson, 2001), or to use it as an indicator of the legal origin a country "inherited" which is supposed to affect future governance or growth (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997). But the effect of colonialism on the performance of countries *while* they were colonies was not studied. Tavares and Wacziarg in their already quoted paper use two dummy

[15] " Frontier expansion [of the Western powers] in turn sustained an expanding trade network, enhanced taxable wealth in Europe, and made support of the armed establishments less onerous than would otherwise have been the case. Europe, in short, launched itself on a self-sustaining cycle in which its military organization sustained, and was sustained by, economic and political expansion at the *expense* [my emphasis] of other peoples and polities of the earth (McNeill, 1982, p. 143, quoted in Arrighi 1991, p.128).

[16] This is a major simplification of Hobson's (1903) view. He distinguished between imperialism (which implied a political power of the metropolis over a restive domestic population) and colonialism which meant population transfer from the metropolis to a broadly empty settlement abroad. Imperialism was, Hobson argued, detrimental to the economic interests of workers in metropolises, but not necessarily to the interests of capital-owners. Thus, it is unclear whether on balance imperialism was, according to Hobson, bad for the overall income of the metropolis. But colonialism (in Hobson's sense) was not a drain on resources since all such countries (Canada, Australia) were fully self-governing and de facto independent.

variables reflecting colonial experience of the countries (one dummy for whether country has even been a colony, another for whether its independence was achieved after 1945). Neither variable is statistically significant in their various formulations (see p. 1369).

Protectionism and growth. The relationship between protectionism and growth has also been subject to a lot of debate. This was, of course, done for the levels of protection in a given country and its rate of growth. Here, however, we have something else in mind: we do not use individual countries' tariff rates (which we do not have) and relate them to countries' growth rates, but rather to the average world level of protection. This is a time-varying proxy for the overall pro-protectionist or pro-free trade stance in the most important countries, and by extension in the whole world. The relationship between this global variable and countries' growth rates has not been, to my knowledge, investigated.

3. The data and some descriptive statistics

The paper uses, for the first time jointly, the three large and recently created databases: Angus Maddison's (2004) series on growth and population, PolityIV data on democracy, and Correlates of War (COW) project's data on civil and international wars, and countries' status (independent or not). Conveniently, the three datasets cover practically the same period. Maddison's series starts in 1820 and ends in 2001.[17] PolityIV series begins in 1800 and ends in 2002. The COW dataset begins in 1816 and goes up to 1997.

[17] Actually, Maddison's data start with year AD 1 but a much denser and more reliable series is available from 1820 onwards.

Each of these three data sets is country- and time-variant. A country/year is our basic unit of observation. Since the data are such a key ingredient in this paper, and since their creation or compilation represents a massive undertaking that is changing our conception of both the present and the past, they need to be described with greater care than is usually allowed to such issues.

Gross domestic income and democracy data. The Gross Domestic Income (GDI) per capita data are obtained from Maddison (2004) and include between 5 (in the years 1821-29) and 162 countries annually for the period 1820-2001. The coverage is gradually expanding throughout the 19th century and from around 1880, the country coverage (measured by the share of world population) reaches more than 2/3. In some benchmark years like 1890, 1900, 1913, the coverage exceeds 95 percent. The average population coverage for the entire period is 73 percent. The democracy data set comes from PolityIV (version 2002). Polity IV provides country scores on democracy, autocracy and a number of other political variables. The annual coverage ranges from a minimum of 20 countries in the early 19th century to 157 countries in 2002. The population coverage is in all but a few years greater than 60 percent of world population and since the 1950s it is between 90 and 100 percent. [18]

[18] In a few years when the coverage dips this is owing to the wars in China (as for example in 1860-61) when due to the unsettled political circumstances there is no Polity coding.

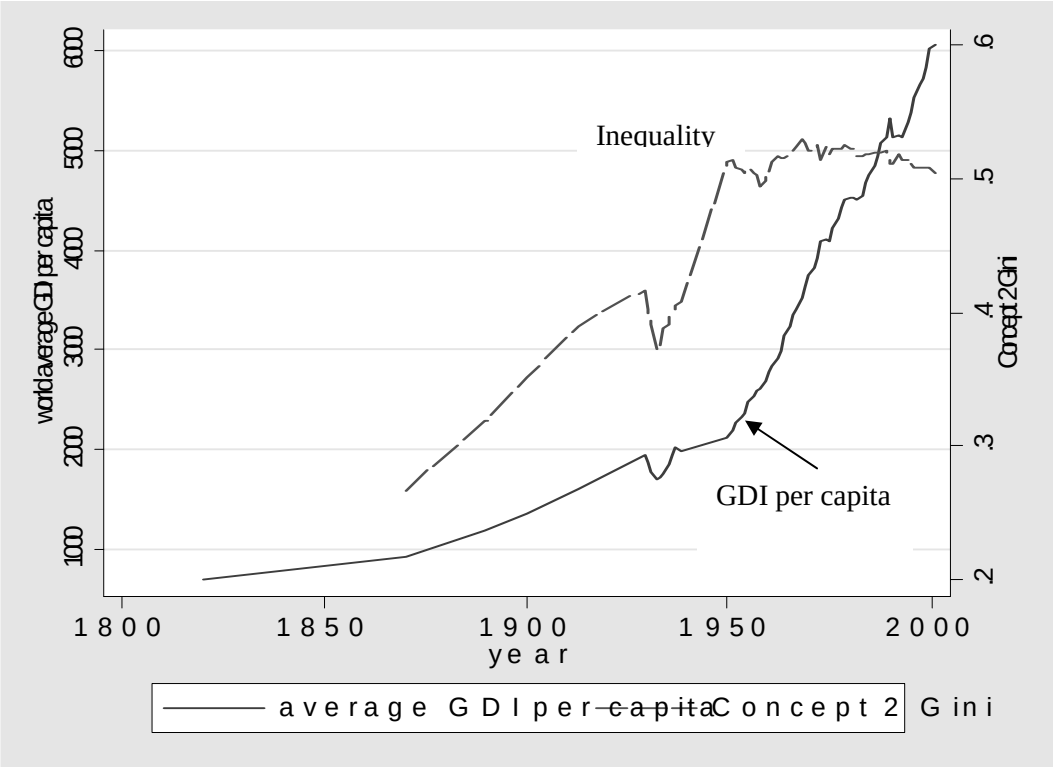
The merging of the two data sets is more difficult than it might seem at first sight. This is because the approaches of Maddison and Polity IV differ in an important respect. Maddison takes, with a few exceptions, as his starting point the currently existing countries and tries to trace historical per capita income on the territory of the countries as they currently are. Thus, for example, Maddison's data aim to present GDI per capita of the populations that were living on the current territory of Germany or Austria or Russia regardless of the fact that these countries might have been larger or smaller at given historical dates. PolityIV data sets takes the opposite, legalistic, approach. It considers as its unit of analysis a "polity" (country) that is a member of the inter-state system at a given point in time and within its contemporaneous borders. [19] This means that the information on the level of democracy in Germany in (say) 1930 will pertain to all territories that were part of Germany then, including for example the territory that is today Poland or Russia. Maddison's German data for 1930, will, on the contrary, refer only to the income produced within what is currently German territory. More details regarding the merging of the two data sets is given in Annex 1.

Figure 1 shows the evolution of the average world GDI per capita (expressed in 1990 Geary-Khamis dollars) over the period 1820-2000 and world Concept 2 inequality (that is, inequality between population-

[19] Being a member of the inter-state system is defined as being accepted as an independent entity either through membership of international organizations like League of Nations or United Nations or by being recognized as an independent entity by at least two major powers. The Polity definition of what is a member of the inter-state system stems from the Correlates of War project (see Singer and Small, 1994). Only entities with population greater than half-million are included in either Polity or Correlates of War databases.

weighted GDIs per capita). [20] In both cases, the data are presented only for the years where at least 70 percent of contemporary world population is included.

Figure 1. World average GDI per capita and international Concept 2 inequality, 1820–2000



Note: Data only for the years where at least 70 percent of world population is included. World average per capita GDI expressed in 1990 Geary–Khamis international dollars (left-hand *y* axis). International inequality is population-weighted Gini coefficient of countries' GDIs per capita (right-hand *y* axis). Source: calculated from Maddison (2004).

Over almost two centuries, the average per capita income has grown from about $PPP 700 in 1820 to a little over $PPP 6,000 in year 2001. This yields a compounded rate of annual per capita growth of 1.2 percent. We notice several dips along the exponentially rising curve in Figure 1, most notably during World War II and in 1990–91. The dashed

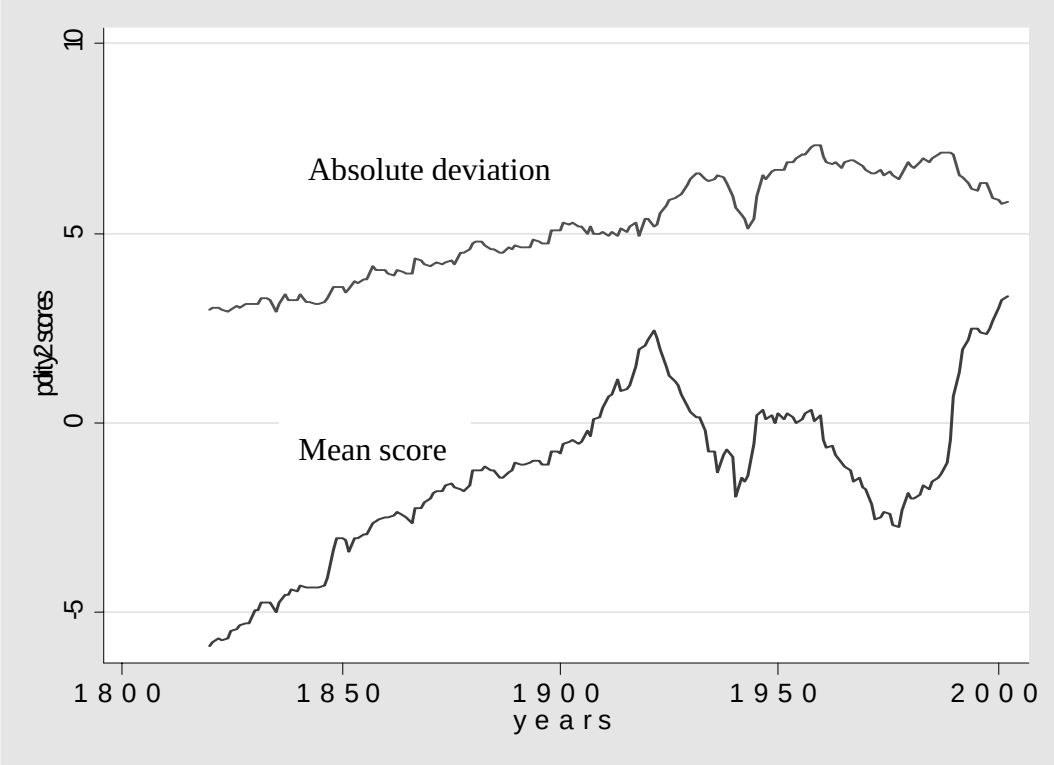
[20] For the definition of Concept 2 inequality, see Milanovic (2005).

line shows international inequality obtained by calculating the Gini coefficients across all countries' GDI per capita weighted by their populations. (This of course leaves out inequality due to within-national distributions, Adding the latter to the Concept 2 inequality would yield global inequality between world citizens.[21]) Here we notice the period of global divergence from the middle of the 19th century until around 1950. After that point, Concept 2 inequality is broadly stable at the level of Gini of 0.5. Figure 1 thus presents the stylized picture of the two most important global economic trends during the last two hundred years: massive increase in output and significant increase in inequality which has however halted, but not reversed, during the last 50 years.

Figure 2 shows PolityIV data on democracy. Democracy is defined by the PolityIV variable called *polity2* which is equal to the score for democracy minus the score for autocracy. As already mentioned, it varies between −10 and + 10.

[21] For an estimate of Concept 3 (global inequality among citizens in the world) over the period 1820-1992 see Bourguignon and Morrisson (2002).

Figure 2. World mean score for democracy and mean absolute deviation of democracy scores 1820-2000



Source: variable *Polity2* from the Polity IV database. *Polity2* index ranges from −10 to + 10. The world mean level of democracy is unweighted (each country in the sample counts the same). The deviation is the average absolute deviation from the mean.

Figure 2 describes the evolution of democracy over the last two centuries. After a steady increase in the democracy score up to mid-1920's, the average world democracy score began an equally steady decline in the inter-war period and then another one as various Communist regimes and dictatorships in the newly independent countries came to power after the end of World War II. However the last twenty years have witnessed a major upswing in democracy so that its average level is now higher than at the previous peak in 1922. Variability in democracy scores has grown almost continuously from the 1850's to

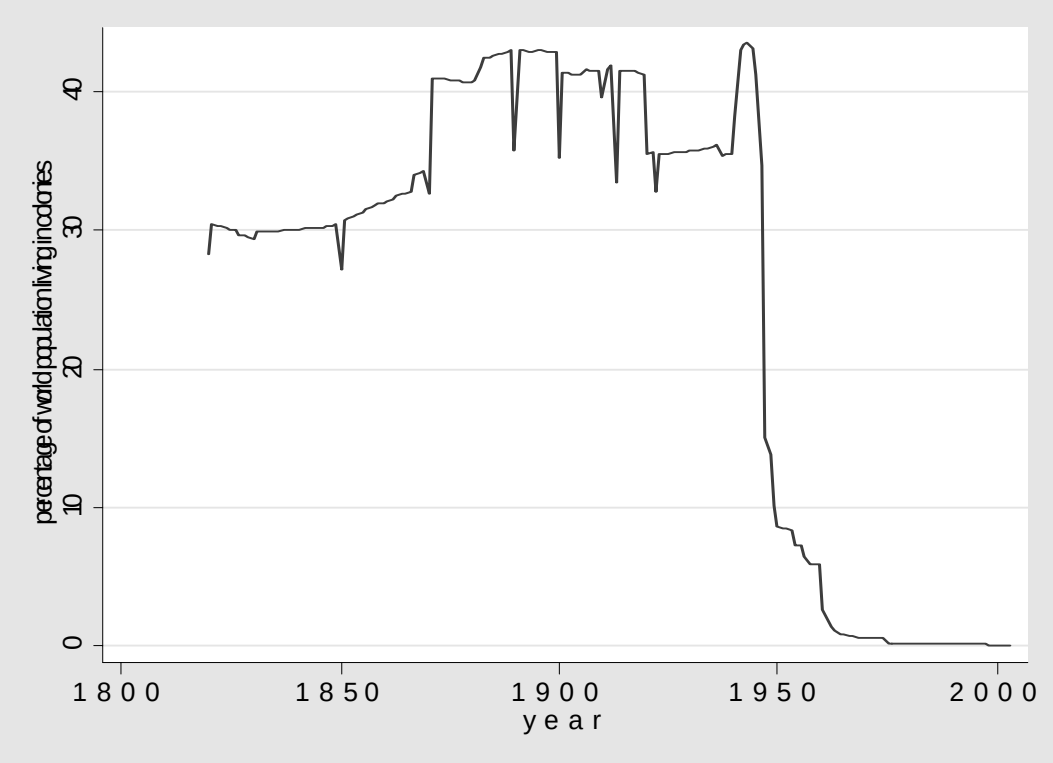
1950's but has recently declined. In other words, country scores are now more similar than they were 20 or 30 years ago.

Data on colonies and wars. We also need to look at the role of colonialism and its obverse, imperialism. To do this we need the data on whether countries were independent or not. We use the data from Correlates of War (COW) project which gives years at which each country has jointed the "inter-state system." Since our interest is in independence as a way to have a self-governing authority in charge of economic policy, we complement the COW definition by considering as independent also self-governing British colonies. They are Canada, Australia, New Zealand and South Africa. [22] Similar adjustments have been made for the countries that have either been independent throughout recent history (e.g. Japan, China, Thailand) although they have joined the inter-state system relatively late (respectively in 1860, 1860 and 1887). These countries are treated as independent throughout (that is, back to 1800). The same approach was also applied to the cases such as Haiti that became independent in 1805 but joined the inter-state system in 1859, and to a slew of Latin American countries that achieved their independence in the early 1820's but did not become members of the inter-state system until twenty or more years later. These and other adjustments to the COW database are spelled out in detail in Annex 1.

[22] According to the official British definition of colonies (see Hobson, 1903, p. 23), colonies were of three kinds: " (1) Crown colonies in which the Crown has the entire control of legislation…(2) colonies possessing representative institutions, but not responsible government…and (3) colonies possessing representative institutions and responsible government." Only the four entities listed above belonged to the latter kind.

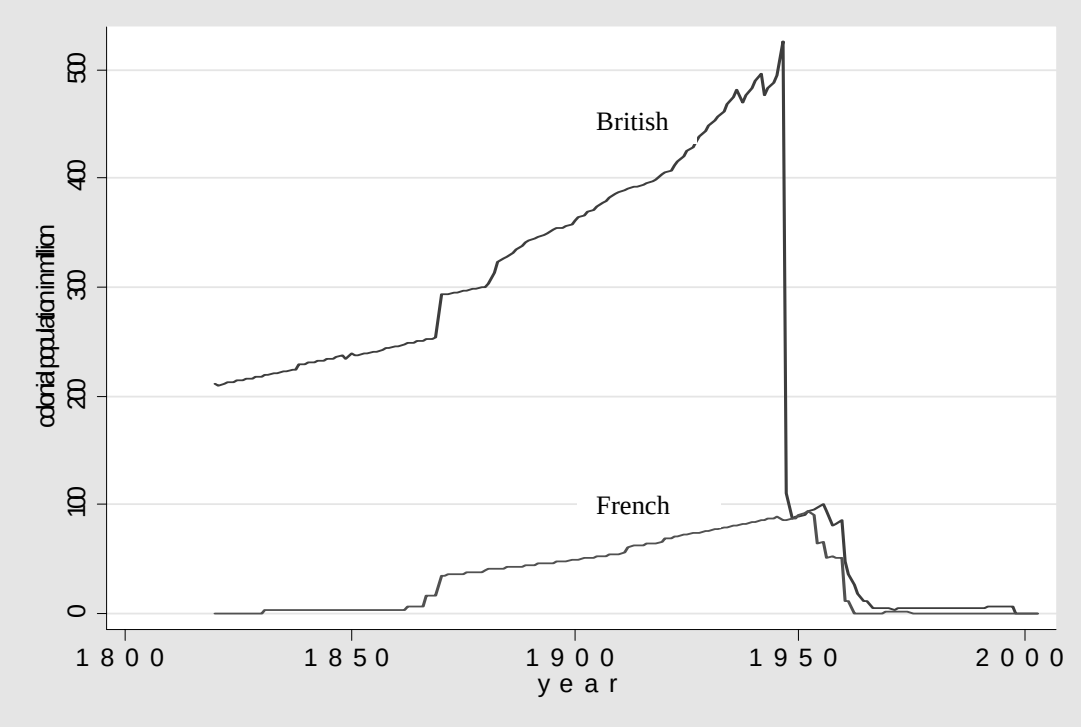
We have thirteen colonial powers (see Annex 1) and for each of them and for each year we calculate total population they controlled. This variable is called "empire." The total number of people living in (say) British colonies gives an annual estimate of the Empire's "pool of human resources" from which it can draw, and which it can possibly exploit through unequal exchange, plunder, unequal treaties or simply policies which are not in the interest of the colonies. Since per capita income levels of colonies were similar, the number of people also serves as a good proxy for the total economic power possessed by colonies and thus potentially free to be used by the metropolises. That this is not a trivial matter was amply illustrated by the importance of colonies as sources of raw materials and labor, and also by the fact (illustrated in Figure 3) that the share of world population living in colonies ranged between 30 and 40 percent throughout the hundred year period ending in 1950. Figure 4 shows the total colonial population controlled by the two largest empires. At its peak, British empire had about 500 million subjects (or 10 people for every person living in the metropolis). The French at their peak controlled about 90 million people in colonies, a ratio of 2-1 with respect to the metropolitan population.

Figure 3. Percentage of world population living in colonies, 1820-2000



Note: Calculated from Correlates of War project. For detailed explanations see Annex 1.

Figure 4. Population (in million) living in British and French colonies, 1820-2000

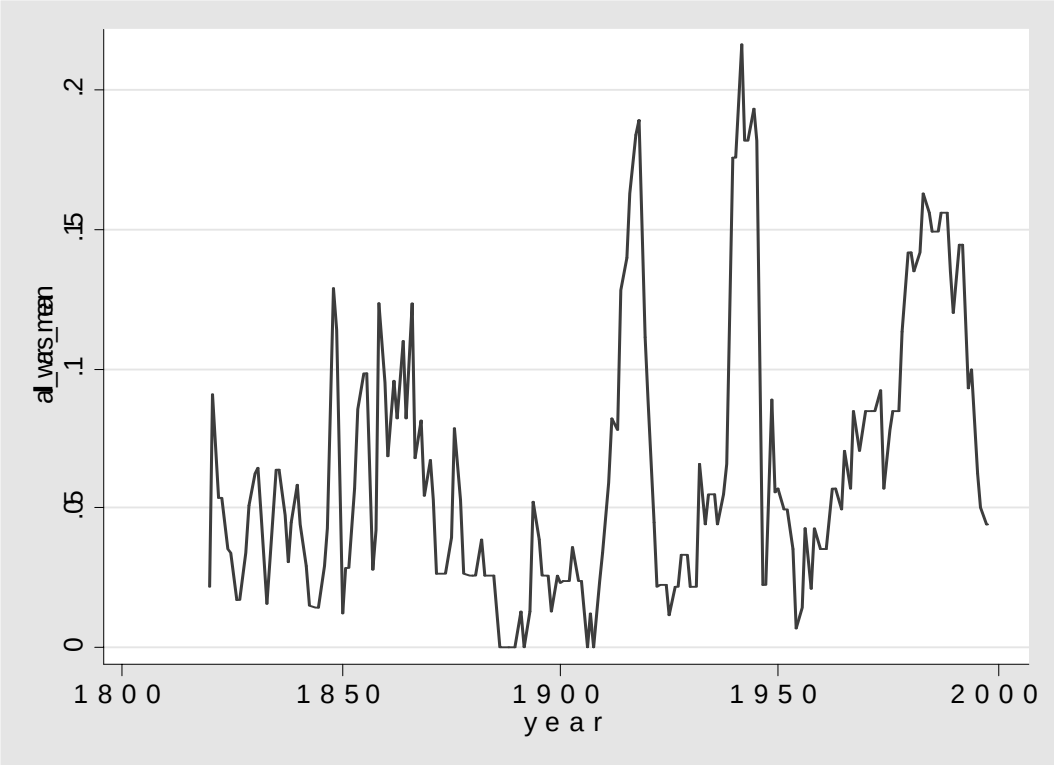


Another important variable is the presence of war. For this we also use Correlates of War project which provides the data on intra-state wars, inter-state wars and extra-state wars covering the period 1816-1997. Intra-state wars are civil wars or violent conflicts which take place within a single state. Inter-state wars are wars between two or more actors (states) belonging to the inter-state global system (e.g. the war between Prussia and France in 1870). Extra-state wars are wars between an acknowledged actor in the inter-state system (say, United Kingdom) and the people (colony) it is trying to conquer. The latter is not an actor in the inter-state system, hence a different appellation.[23] Participant countries in each of these wars are treated as countries at war for the years during which the war lasted. [24] Figure 5 shows the average likelihood of being involved in the first two kinds of wars (intra- and inter-state). The average annual probability over the last 180 years was 6.6 percent with the peaks of some 20 percent during the two World Wars. During the heyday of Globalization I (1870-1914), frequency of these two types of wars (although not colonial wars) was relatively small—under 5 percent.

[23] Practically all extra-state wars are colonial wars or wars of national liberation. It is difficult at times to make an unambiguous distinction between intra-state wars (such as for example Ottoman Empire vs. Mehmet Ali in Egypt, or Mexico vs. the Yucatan Maya) and extra-state wars such the British-Ashanti wars or the French-Algerian war.

[24] Obviously, in intra-state wars although the sides may be many, only one country is coded as being at war. For the inter-state wars, at least two countries are coded as being at war. For extra-state wars only the country (participant) on whose soil the war was fought was coded as having been involved in a war.

Figure 5. Average annual frequency of wars, 1820-1997

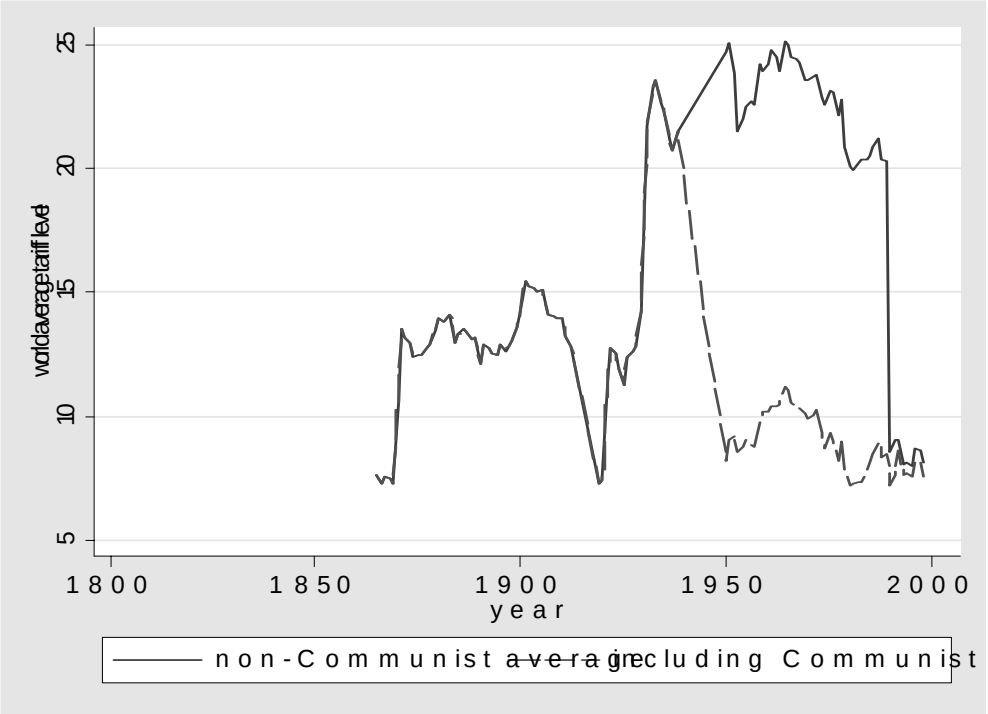


Source: Calculations from the database Correlates of Wars. Note: Includes only intra-state wars (civil wars) and wars between the states members of the international system.

Data on protectionism. We next move to time-variant (but not country-variant) variables. One such variable available for the period of about two hundred years is world average level of protection. The data were calculated from Coatsworth and Williamson (2003) who provide regional unweighted averages of nominal tariff rates. There are six regions in their calculations: the core European countries (Germany, France and the UK), European periphery (ten countries), West European offshoots (Canada, Australia, New Zealand), Latin American countries (eight), Asian countries (ten including China and India), and the United States. Thus 35 country-data were used to create regional tariff averages. We have then used these regional averages to create an estimate of world

average tariff rate along the same lines as Coatsworth and Williamson (2003) who did the (world-level) calculations for the period up to 1950. The results are shown in Figure 6. In addition, since Coatsworth-Williamson data do not include Communist countries (China and Russia are included only for the period when they were not Communist), we augment the Coatsworth-Williamson data by assuming that the average tariff rates under Communism were 100 percent. This is of course an arbitrary although not unrealistic assumption since Communist countries were almost with no exception closed economies; although tariff rates did not play much of a role in trade, protection was provided through a system of allocated foreign exchange and bilateral bargaining deals. So protection was undoubtedly high.

Figure 6. Estimated average level of tariff protection in the world, 1865-2000



Note: calculated from six regional averages given by Coatsworth and Williamson (2003) and then weighted by regional GDIs (in PPP dollars from Maddison, 2004). The data including Communist countries assume that Communist countries' average tariff rate was 100 percent. Data including Communist countries=solid line.

Figure 6 shows two different patterns of protection depending on whether we include Communist-ruled countries or not. If we do not, then we notice a decrease in protection from an average of 15 percent in the 19th century to only 7 percent between 1900 and 1925. This was followed by a sharp reversal until the end of World War II when, with the creation of the European Economic Community and different GATT rounds, the average level of protection fell again to below 10 percent. However, if we include Communist countries, the average level of (income-weighted)

protection exceeded 20 percent until the early 1990s when it dropped following the collapse of the Communist system.

Data on Communism. The years of Communist rule are considered as all the years when countries were characterized by (i) the monopoly of political power exercised by a Communist party, and (ii) predominantly state-owned and centralized economy. This of course makes most of Eastern European and Baltic countries Communist from around 1945-8 (depending on the country) until 1990, the Soviet Union (with the exception of the Baltics and Moldova) plus Mongolia from the early1920 to 1991, Cuba and Vietnam from respectively 1960 and 1976 to today. [25] Thus as Communist are considered all countries that were members of the CMEA plus Yugoslavia and Albania.

A difficult decision concerns China. While China is still nominally a Communist country, the importance of non-state ownership in its economy has risen to a share where the country cannot any longer be meaningfully considered Communist. We have decided to treat China as non-Communist from the first year when the state-owned share in the industrial value added dropped below 50 percent.[26] This is 1992.

[25] Only a unified Vietnam appears in Maddison data. We thus include Vietnam only for the period after 1975.

[26] See *Statistical yearbook of China 1996*, p. 401. Agriculture has been mostly de facto private since the introduction of the " responsibility system" in 1978.

4. Empirical analysis: what explains growth?

Variables we use. In the empirical analysis of growth, we use three types of variables (see equation 1): those that are both time- and country-variant, those that are only time-variant (and thus the same across all countries), and those that are only country-variant (and thus the same across time).

The first group of variables includes both continuous and binary (indicator) variables. For example, GDI growth rate (the dependent variable), level of democracy, regime durability, level of GDI per capita, population growth rate, and empire are continuous variables. The roles of democracy and empire have already been examined. GDI per capita and population growth rate are included as explanatory variables based directly on the neoclassical Solow model. We also include a regime durability variable from PolityIV database which measures the number of years that a given regime has been unchanged. [27] We expect this variable to be negatively related to growth both in democracies where, based on Olson (1982) and Weede (1997), we expect that the power of entrenched interest groups would increase with the length of time a regime has been in power, and in dictatorships where we expect, based mostly on the African experience (van de Walle 2005), that the regimes grow more predatory in time. [28]

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[27] More exactly, it is defined as "the number of years since the last substantive change in authority characteristics" (see Marshall and Jaggers, 2004, p. 16). The substantive change is defined as at least a three-point change in the *polity2* score.

[28] Least educated countries tend to have longest-serving leaders (see Glaeser, La Porta Lopez-de-Silanes, and Shleifer, 2004, p. 286). " Serving" is only a manner of speaking.

We include several time- and country-variant indicator variables. They are political status of the country (independent, colony), basic political system (Communist or not), and involvement in civil or inter-state wars. [29] These variables vary across years and countries but can take only two values (0 and 1).

The second group of variables includes those that stand for what may be called *Zeitgeist*, the spirit of the times or time-idiosyncratic variables. They are world average level of protection, and world average level of democracy. They reflect how protectionist and democratic the world is at any given point in time—a fact which might affect countries' growth rates by facilitating exchanges whether by trade or transfer of technology or through copying of (better) social forms of organization. We would expect that a more open world in these two important aspects (trade and democracy) would exert a positive impact on growth in individual countries—whatever the economic policy or democracy stance of the countries themselves.

[29] The war variable for COW has not, to the best of my knowledge, been used in growth regressions. Other similar variables, like frequency of coups and revolutions, have. Barro (1991) finds that coups and revolutions are negatively correlated with growth. Levine and Renelt (1992) do not find direct correlation between revolutions and coups, and growth but argue that " wars" influence growth (negatively) through reduction in investment/GDI ratio. Whatever the case, there is little doubt that wars are, on balance, negatively correlated with economic growth. Here, a war year is defined as a year of inter- or intra-state war as coded by the Correlates of War database and provided that the number of casualties is greater than 1000. The latter is a conventional cut-off point: we introduce it to disregard relatively small conflicts that are unlikely to have much of an impact on economic life.

The third type of variables are country-specific. We allow for them by using a fixed-effect (or Least Squre Dummy Variable) formulation of equation (1). Country-specific variables are supposed to be some unobservable characteristics that define a country and that do not vary in time. Over such a long period of two centuries, and with changes in countries' borders, such characteristics are not as likely to be time-invariant as in the usual panel analysis. Nevertheless, there are, arguably, certain characteristics that are country-specific and that might have "survived" over two centuries: they are features such as language, religious composition, shared heritage etc. The regression we estimate is:

$$\ln y_{it} - \ln y_{i,t-1} = \beta_1 y_{i,t-1} + \sum_{j=2} \beta_j X_{jit} + \sum_k \alpha_k Z_{kt} + D_i + \gamma \ln V_{it} + \varepsilon_{it} \qquad (1)$$

where y_{it} = GDI per capita of country *i* at time (year) *t,* X' s time- and country-variant variables, Z' s time-variant variables, D_i = country dummy, ln V_{it} = ln (n_{it}+ g+ δ) where n_{it}= population growth rate, g=rate of labor augmenting technological progress and δ =depreciation rate (all derived from the textbook Solow model of economic growth) and ε $_{it}$ = county- and time-dependent error term.[30]

Results. We shall throughout use a fixed effect regressions without instruments since we lack a suitable long-term instrument for democracy (or for that matter for any other, potentially endogenous, regressor).[31] However, in order to account for the possible reverse causality from

[30] The sum of g and δ is assumed to be 0.03 (3 percent).

[31] The instrument for democracy should also ideally be time-varying. Short of lagged values for democracy it is difficult to see any such instruments for the period 1820-2000.

growth to democracy and for the fact that the effect of regressors on growth may not be immediate (or may not take place within a year which is the unit of analysis here), we shall also run equation such as (1) for five-year non-overlapping period averages (see results in Annex 2).

Table 1. Regression results, per capita growth 1820-2000
(country fixed effects)

	I	II	III	IV	V
Depend. var.	ROG_{it} if indep=1	ROG_{it}	$ROG_{it}-ROG_{wt}$	$ROG_{it}-ROG_{wt}$	$ROG_{it}-ROG_{wt}$
Initial GDI per capita	-0.013 (0)	-0.008 (0)	-0.009 (0)	-0.009 (0)	-0.010 (0)
$\ln(n_{it}+\delta+\lambda)$	-0.013 (0.001)	-0.014 (0)	0.001 (0.985)	0.0001 (0.987)	-0.0003 (0.957)
Polity2	-0.003 (0.018)				
Ln (GDI per capita)* Polity2	0.0004 (0.007)				
Polity2_world mean	-0.001 (0.063)	-0.001 (0.121)			
Regime durability	0.000005 (0.914)				
War (0-1)	-0.030 (0)	-0.030 (0)	-0.042 (0)	-0.042 (0)	-0.042 (0)
Communist (0-1)	0.024 (0)	0.020 (0)	0.015 (0.028)	0.015 (0.029)	0.015 (0.025)
World average tariff rate 1/	-0.001 (0)	-0.001 (0)			
Independence (0- 1)		-0.004 (0.084)	0.012 (0)	0.011 (0.001)	
Empire		-0.00003 (0.325)	-0.00002 (0.678)	-0.00002 (0.680)	-0.00002 (0.671)
Colonial wars				-0.005 (0.587)	-0.012 (0.211)
English colony					-0.006 (0.241)
French colony					0.008 (0.244)
Portuguese colony					-0.003 (0.805)
Spanish colony					-0.021 (0.411)
Germany colony					-0.128 (0)
US colony					-0.018 (0.338)
Dutch colony					-0.027 (0.105)
Japanese colony					-0.068

					(0)
Belgian colony					0.002 (0.923)
Italian colony					-0.050 (0.056)
South African colony					0.00008 (0.998)
Constant	0.086 (0)	0.048 (0.001)	0.061 (0.001)	0.061 (0.001)	0.078 (0)
No of obs. R-squared	7529 0.0252	9027 0.0230	9583 0.0175	9583 0.0175	9455 0.0238
F value	21.19 (0)	26.07 (0)	27.88 (0)	23.94 (0)	13.32 (0)

Note: *p*-values between parenthesis. ROG_{it}=rate of annual GDI per capita growth. ROG_{wt}= rate of growth of world GDI per capita. Coefficients significant at less than 5 percent level are shaded.
1/ Communist countries not included.

Regression I (Table 1) shows our first formulation. It does not include colonialism and is run across independent country/years only. The results show conditional income convergence (in the sense that a given country grows slower when its GDI per capita is higher). Own democracy is associated with slower growth. However there is some non-linearity as the coefficient on the interaction term between income and democracy is positive. As income per capita grows the interaction term at first partially offsets and then overturns the negative coefficient on the *polity2* variable. Moreover, the turning point occurs at a relatively low income just above $PPP1,000 [32] or income level of Ghana and Zimbabwe in the year 2000. Thus for all intents and purposes, democracy seem to be associated with a positive effect on growth which moreover increases in income. For example, at the GDI per capita of about $5,000 and *polity2* value of 7, the gain from one point increase in democracy is 0.4 percent per capita per annum; at GDI per capita of $15,000 and democracy score of 7, the gain is 0.6 percent. [33] The positive effect of democracy is even more visible if we look at the data "sliced" into five-year non-overlapping intervals. In such a formulation, democracy is given more time to affect growth. There the effect of growth is positive throughout (i.e. regardless of income level) and amounts to 0.1 percent per capita per annum (see Annex 2).

The average level of democracy in the world, on the contrary, has no statistically significant effect on growth, nor does, *pace* Olson, own regime durability. War, not unexpectedly, has both a statistically

[32] All values are in 1990 Geary-Khamis international dollars.

[33] The gain, of course, increases with higher values of both income and democracy but the income turning point is, whatever the *polity2* value, the same.

significant and economically meaningful negative impact. Each year of involvement in civil or international wars lowers GDI per capita by some 3 percentage points. Communist years have had a positive effect on growth amounting to about 2.4 percentage points (compared to the alternative of not being Communist and everything else being the same). Higher global level of protectionism is negatively associated with growth: a 1 percent increase in world average tariff rate is associated with growth rate reduction of 1/10 of one percent.

The Bairoch hypothesis examined. In Regression II, we introduce a time- and country-varying indicator for being a colony as well as the empire variable. Here however we face the following problem. Normally, when a country is colony its *polity2* score is missing. A few cases where it is not (see Table 1 in Annex 1) are exceptional and thus of limited importance. [34] Therefore, if we introduce an indicator variable for being a colony, we have to drop the democracy variable. This is done in Regression II. The results for all the "old" variables are as before, and neither of the two "new" variables, independence and empire, is significant.

In Regression III, we redefine somewhat our approach. The lack of the effect of colonialism may have been due to the changed nature of technological progress—a variable which is in the background of our analysis. We thus ask whether growth of a given country when it was a colony and when it became independent was the same—not in absolute

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[34] There are only 45 observations where *polity2* variable is available when countries are colonies vs. more than 1,400 missing (see Table 3 in Annex 1).

terms any more but compared to the average world growth. [35] The mean-normalization through the use of world average growth rate also sweeps away idiosyncratic time effects (like, for example, the oil crisis). In other words, we look at a country's relative growth rate and ask: is it growing faster than the rest of the world or not, and does its political status (colony, independent) matter? [36] The results show that the conditional convergence, negative impact of wars, and positive impact of communism survive in this formulation. Wars become even more detrimental to growth. Our main variable of interest, independence is associated with a statistically significant relative growth gain of 1.2 percentage points. Since the empire variable remains statistically insignificant, we would—based on the analysis so far—tend to conclude that the Bairoch hypothesis is supported by the facts.

In Regression IV we introduce another effect of colonialism: colonial wars (and wars of national independence) which are coded separately by Correlates of War project. The significance and magnitude of other coefficients remain unchanged while colonial wars are not statistically significant.

In Regression V, we try to see what is really behind the negative impact of colonialism on relative growth: were all colonies (regardless of the metropolis) equally affected? The results show that the positive sign

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[35]We drop other global (time-varying) variables such as the average level of democracy and world protectionism since their interpretation is no longer clear.

[36] The dependent variable is now country's growth rate minus world growth rate (all in annual and contemporaneous terms).

on the independence variable (that is, the negative effect of being a colony) is explained by the negative impact on growth exerted by German and Japanese occupations. In the former case, the effect is entirely due to the Second World War when output in European countries occupied by Germany plummeted: if we run the same regression as V while dropping the years 1939-45, the effect disappears (results not shown here). [37] In the case of Japan, however, the negative effect of colonialism is different: it is caused by the exceptionally fast *post*-colonial growth of South Korea and Taiwan. Thus at a closer inspection, a "generalized" independence dividend dissipates or is shown to stand for the post World War II economic success of the East Asian countries. None of the other colonial variables in regression V is significant.

The result we obtain is therefore that a country's relative growth rate is unrelated to its being independent or not. The independence dividend seems to have been nil, and so was the empire dividend for the metropolises. Figure 7 illustrates the lack of the independence dividend using the examples of the British and French colonies. It shows the distribution of the relative growth rates of the countries that were British (in the left panel) and French (in the right panel) colonies when they were colonies and when independent. [38] There is no statistical difference in the distributions, nor in the means and medians (see Table 2).

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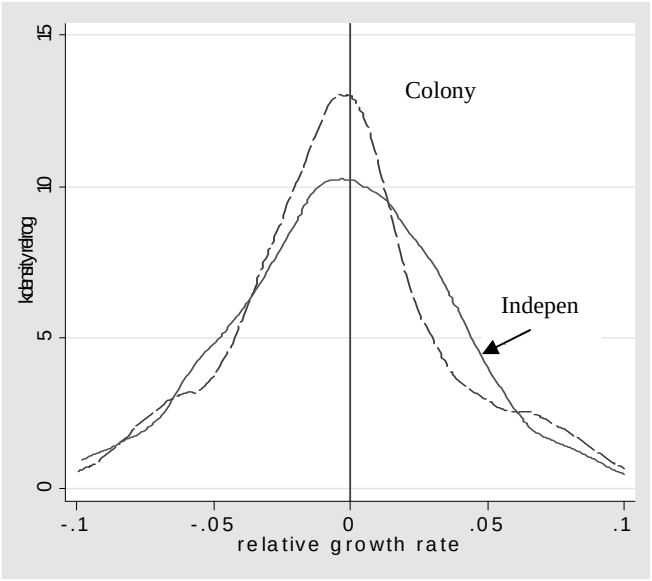
[37] These are the only German-occupied countries for which we have both GDI per capita and population data so that they can be included in the regressions. The GDI data for Tanzania, Togo, Namibia etc. when they were German colonies are not available.

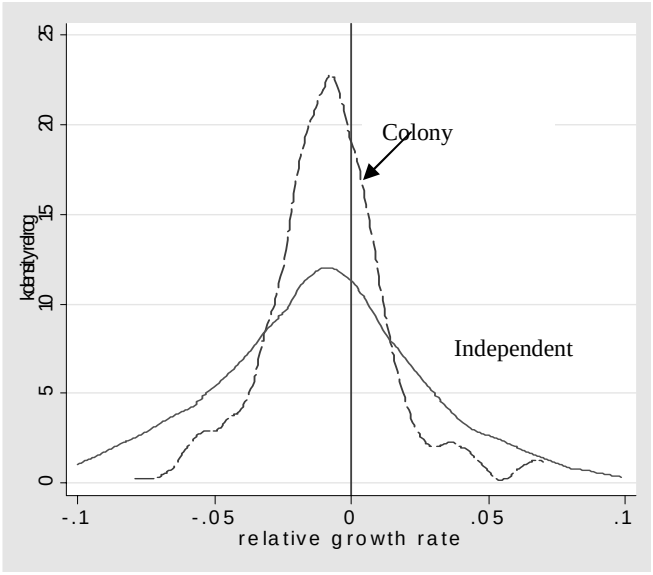
[38] These two empires accounted for the bulk of colonies (see Table 2 in Annex 1). The results here are based on 1,348 observations (annual growth rates) for twenty-three British colonies, and 1,224 growth rates for twenty-four French colonies so the sample size or the selection bias are unlikely to have driven the results.

Figure 7. Distribution of relative growth rates of countries when they were colonies and when independent

British colonies



French colonies



Note: Colonial years=dashed line; independence=solid line.

Definition: Relative growth rate is a country's growth rate minus world growth rate in the same year, expressed in fractiles, e.g. 0.05 is 5%.

Table 2. Relative growth rates of British and French colonies when colonies and when independent

	British		French	
	As colonies	As independent	As colonies	As independent
Mean	-0.2	-0.8	-0.8	-1.4
Median	-0.4	-0.4	-0.8	-1.0
t-test of equality of means	1.4 (0.16)		1.7 (0.09)	
χ^2 test of equality of medians	0.003 (0.95)		0.70 (0.40)	

Note: *p* values between parentheses. Definition: Relative growth rate is a country's growth rate minus world growth rate in the same year, expressed in fractiles, e.g. 0.05 is 5%.

Democracy and growth at different income levels. The redefinition of growth in relative terms allows us to go back to the issue of the relationship between democracy and growth. As we have noticed in Regression I, at higher levels of income, democracy has an increasingly positive impact on growth. We illustrate this point in Figure 8. The left panel shows the distribution of relative growth rates among dictatorships and democracies at very low income levels (under $PPP 3,000).[39] The two distributions are practically the same (the Kolmogorov-Smirnov test easily accepts the equality of distributions). The two medians are also practically the same: -0.50 percent for the dictatorships and -0.43 percent for democracies.

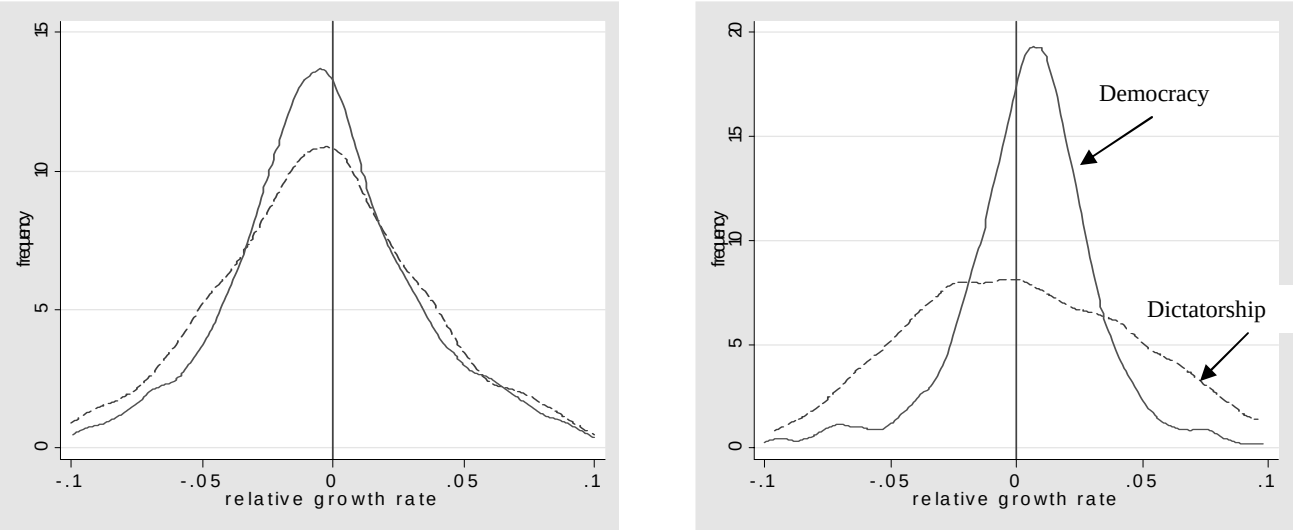
Consider now the right panel which displays the two distributions of relative growth rates in higher income countries, those above $PPP

[39] Dictatorships are defined as observations with a *polity2* score less than 0; democracies as observations with a *polity2* score greater than + 5.

8,100. The situation is clearly different here: democracies display much less variability in outcomes and also a higher median and mean growth rate. The median relative growth rate for the rich democracies (in peace) is +0.7 percent, for the rich dictatorships (in peace) −1.0 percent; the means are respectively +0.6 percent and −1.4 percent. [40]

Figure 8. Distributions of relative growth rates of dictatorships and democracies in poor and rich countries

Poor countries Rich countries



Note: Solid line=democracy; dashed line=dictatorship. Dictatorship is defined as *polity2*<0; democracy as *polity2*>5. Poor countries are defined as those with GDI per capita less than $PPP3,000; rich countries as those with GDI per capita greater than $PPP8,100. Relative growth rate is a country's growth rate minus world growth rate in the same year, expressed in fractiles, e.g. 0.05 is 5%. All observations are annual.

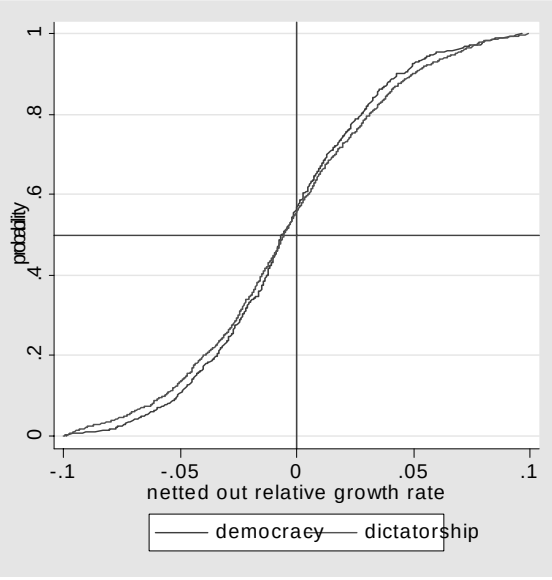
The same result—better performance of democracies than dictatorships at high income levels—is confirmed if we run a regression such as (1) but which "nets out" all the effects on growth except for

[40] It may be thought that the number of observations of dictatorships with high incomes would be small or limited to oil-rich countries. This is not the case: we have 123 observations including those for Argentina, Czechoslovakia, Singapore and Taiwan.

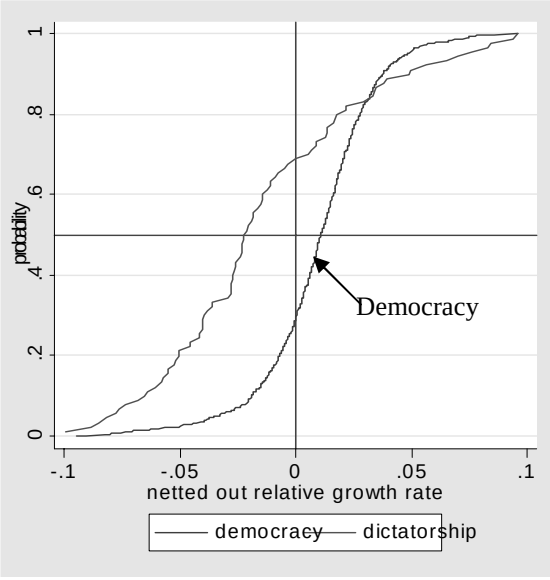
income. The cumulative distribution of the growth rates controlled for all the other variables is then plotted in Figure 9 (right panel) for high income democracies and dictatorships.[41] More than 70 percent of relative growth rates in rich dictatorships are negative (that is, lower than the world average in a given year), while the same percentage for the rich democracies is less than 30. But in poor countries (see left panel in Figure 9), the distribution of relative growth rates between dictatorships and democracies is almost identical.

Figure 9. Cumulative distribution of countries' relative growth rates in democracies and dictatorships controlled for all variables but income level

Poor countries



Rich countries



Note: Relative growth rate is a country's growth rate minus world growth rate in the same year. It is netted out, using regression such as (1), of all effects except for income and expressed in fractiles, e.g. 0.05 is 5%. Dictatorship is defined as *polity2*<0; democracy as *polity2*>5. Poor countries are defined as those with GDI per capita less than $PPP3,000; rich countries as those with GDI per capita greater than $PPP8,100. All observations are annual.

[41] This is the residual obtained as actual growth rate minus the predicted growth rate from regression such as (1) which includes all the variables save for income.

Introducing heterogeneous slopes. Dynamic panel regressions such as (1) yield inconsistent parameter estimates in fixed effects. This is because the disturbance term in (1) and the lagged income on the RHS are correlated. The problem is particularly severe in small samples. It is less severe if time and cross sectional dimensions are (as here) large and if the "true" parameters are homogeneous, i.e. if the true state of the world is such that slopes for all the countries are the same. (This is what we implicitly assume when running fixed effect regressions). But if the true state of the world is that, while the model is the same for all the countries, the slopes are heterogeneous, the inconsistency of the estimators does not disappear even when the time and cross sectional dimensions tend to infinity. And there are indeed good reasons to believe that the slopes may differ between the countries. To allow for slopes' heterogeneity, we rewrite (1) as

$$\ln y_{it} - \ln y_{i,t-1} = \sum_{j=1} \phi_{ji} X_{jit} + \varepsilon_{it} \qquad \text{for } \forall \text{i} \qquad (2)$$

where ϕ_{ji} is country *i*-th specific estimate of the coefficient of the variable X_j (for simplicity we denote both the lagged value of *y* and other independent variables as X' s). Now, the use of (2) means that the same regression will be run across each country and county slopes retrieved from individual regressions. This is, of course, a feasible strategy only if we have a sufficiently long time-series so that there is a meaningful number of data points for each country.

Therefore (2) is run across each country with the number of data points varying depending primarily on the number of observations of

country's growth rate. Some countries like the UK have continuous data for more than 150 years; at the other extreme are Belarus and Albania where we have data for only 11 and 12 years.[42] We can retrieve country-specific slopes for all the RHS variables. Here however we are interested in the effect of democracy on growth. The results will be presented for this variable only.

Consider first the distribution of the coefficients on *polity2* variable. We have regression results for 133 countries. The mean value of the slopes (the mean group estimator, MGE) is +0.11 percent per capita p.a. and the standard deviation is 0.48—clearly implying a very wide distribution of the outcomes . The hypothesis that the MGE (which is distributed normally) is not statistically different from zero cannot be rejected. But also, "assigning" to each country the same coefficient seriously underestimates the diversity of outcomes. A more interesting question is then a non-parametric one: what is the distribution of the country-specific coefficients on the *polity2* variable, and is the effect of democracy on growth in most cases positive or not? In 64 percent of the countries, the coefficient on *polity2* is positive (Table 3). The result becomes even stronger, reaching almost 70 percent of the cases if we look at the distribution of the statistically significant (at the 5 percent or less) slopes only. [43] In conclusion, the results obtained using heterogeneous coefficients on democracy, suggest that: (1) there is a huge variability across countries in the effect of democracy on growth, (2)

[42] This is because the regressions are run across independent and non-Communist country/years only. We also "lose" some countries because *polity2* does not vary. This is the case of the United States where *polity2* is dropped from the regression.

[43] A little over one-half of the coefficients are statistically significant (see Table 10).

that in more than 60 percent and possibly up to 70 percent of the cases the effect of democracy is positive, and yet (3) if we want to express the effect using one number only we cannot reject the hypothesis that it is not significantly different from zero

Table 3: Heterogeneous slopes: the effect of *polity2* on growth when allowed to vary between countries

	Coefficient on *polity2* variable	
	All country coefficients	Only statistically significant country coefficients
Mean	+ 0.11	+ 0.18
St.deviation	+ 0.48	+ 0.59
Median	+ 0.09	+ 0.34
Percentage positive	64	69
Total number of countries	118	65

Note: excludes outliers, that is regression coefficients that are greater than 1 in absolute value. Fifteen coefficients are dropped.

5. Conclusions

We have looked at the record spanning some two hundred years of modern growth, democracy, protectionism and political developments reflected in the rise of fall of colonialism and then the rise and fall of Communism. To do this we have merged three recently-created large data bases: Maddison's data on world incomes, PolityIV data on democracy, and Correlates of War data on wars and political status of the countries. The advantage of this uniquely large data base of some 10,000 observations on countries' annual growth rates and several variables that have previously been found correlated with growth allows us to test several important hypotheses.

The first hypothesis deals with the effect of democracy on growth. We find the effect to be either positive throughout income spectrum or to be slightly non-linear in the sense that democracies outperform dictatorships at all income levels but the very lowest. The difference between the performance of democracies and dictatorships increases as income level goes up. Thus, for example, in rich countries (defined as those with GDI per capita above $8,100) and controlled for all other relevant own-country variables like war, Communism, population growth, and regime durability, more than 70 percent of dictatorships in any one year grow slower than the world average, but less than a third of democracies do.

We find no evidence however that the average level of democracy in the world has much to do with individual countries' growth rates. In other words, there is no positive externality bestowed by democratization.

Democracy—as far as growth is concerned—does not seem to have any "publicness": it benefits only countries that are democratic, not their dictatorial neighbors.

We find no evidence for either benign on malign effect of colonialism on growth rates. The size of the empire is consistently insignificant in the regressions: so imperialism does not seem to have helped the metropolises raise their growth rate. But similarly we do not find any effect of colonialism on the growth rate of colonies. The growth rates of the British and French colonies—which of course account for the bulk of all colonies—relative to the rest of the world do not show any significant difference between the colonial and post-colonial periods, nor between themselves. Unlike some other papers, we find no evidence that British colonies did better, either while they were colonies or during independence, than the French colonies. We reject all three hypotheses regarding the effect of colonialism: Bairoch's (negative effect on colonies, none on metropolises), Amin's (negative on colonies, positive on metropolises) and Hobson's (negative on both). This, of course, does not exclude the possibility that colonialism slowed down the growth rate of colonies not only while they were colonies but permanently. The bad effects of colonialism thus may linger on. But this is not a hypithesis we are exploring in the paper.

Another global political phenomenon was Communism. We find a positive effect of Communism on growth (approximately 1.5 percent per capita per annum on average). Thus we find it difficult to argue that the fall of Communism was caused by its economic inefficiency.

Not surprisingly, we find the effect of civil conflicts and wars to have been statistically significant and economically meaningfully negative, implying a loss of GDI per capita of between 3 and 4 percent for each year of serious conflict (defined conventionally as the conflicts with the number of casualties above 1,000 per year). There is very little doubt that the negative effect of war is significant and, to use a pun of perhaps dubious taste, that it will "survive" in any similar regressions.

Unlike democracy which does not seem to generate externalities, protectionism, it appears, does. Higher level of world average tariff rate is robustly and negatively associated with individual countries' growth—whether the countries themselves are projectionist or not. There is thus some evidence for the benign effects of generally lower tariff rates.

Annex 1. Data issues

Merging PolityIV and Maddison GDI databases

PolityIV data base provides information on political variables (levels of democracy, autocracy etc.) for all independent entities from 1800 to 2002. An independent entity is defined as a unit that is a member of the inter-state system (such as League of Nations or United Nations) or is recognized as an independent entity by at least two major powers. The approach is historical in the sense that political variables are assessed for any given entity within its contemporaneous borders. Thus for example, for the period before 1860, there are data for different units which later composed Italy: Papal States, the Two Sicilies, Parma, Sardinia and so forth. It is only after 1860 that the data for Italy exist. Similarly, for example, the data for Estonia are given for the period when Estonia existed as an independent entity: between 1919 and 1940 and then again after 1991. The data on India begin in 1950 etc. The PolityIV approach is therefore very clear but is not fully compatible with the approach followed by Maddison when he created his database of historical GDIs per capita and population.

Maddison's approach is to take the currently (around year 2000) existing countries as the unit of analysis and try to trace the level of income and population over the territory they currently (in 2004) occupy. As can be quickly seen, the PolityIV and Maddison approach are very different when country borders change. Maddison estimates GDI per capita over the territory of current Italy in (say) 1820, while PolityIV data provides information on democracy in different (Italian) units none of which is equal to today's Italy and which may have had various levels of

democracy. For example, *polity2* scores for the constituent parts of the future Italy cover the range from -10 for the Kingdom of two Sicilies, Modena, Parma and Tuscany, -9 for Papal States to -7 for Sardinia. Similar examples abound. For 1820, Maddison provides separate estimates of GDI per capita for Austria, Hungary and Czechoslovakia although they were then the same country. Moreover, Maddison's approach is not fully consistent as this example illustrates. If always only current states were considered, then the data should have been provided for the Czech republic and Slovakia separately. Maddison similarly provides estimates for the territory of the USSR (and implicitly of the Czarist Russia[44]) going back to 1500 but the data for Russia (within its current borders) are given only for the period after 1991.

The task was then to adapt the PolityIV data to those produced by Maddison. This approach, rather than reverse, was chosen because GDI per capita data are key for our research and because PolityIV data are more detailed (broader in terms of coverage). Hence the task was to "squeeze" as much information from PolityIV to fit the Maddison requirements. To do this we have followed the three rules.

The dominant country rule. When a country goes through the unification-division-unification (UDU) or through divided-unified (DU) processes, the data for the "dominant" country—defined in terms of population and GDI, e.g. West Germany vs. East Germany, or South Korea vs. North Korea—are used. This implies that South Korea is considered as a successor to the unified Korea: the PolityIV data from 1800 up to 1905

[44] Although of course the two territories were not the same.

(when Korea was annexed by Japan) and which pertain to the entire territory of the peninsula are "continued" with the data on South Korea only. [45] Similarly, Maddison income data that pertain to the territory of the present-day Germany are paired with PolityIV democracy data that refer first to Prussia from 1820 to 1868, then with those on Germany as it existed from 1868 to 1945, then with PolityIV data for West Germany only, and since 1991 with the data for the current Federal Republic of Germany. The data series for both democracy and income are thus uninterrupted for Germany since 1850 but the territory for which PolityIV data strictly speaking refer does not always coincide with the territory which is covered by Maddison's income estimates.

Territorial rule. When the territory does not change significantly (as for example between Czarist Russia and the USSR), the PolityIV data which refer respectively to Russia (1800-1917) and the USSR (1917-1991) are applied to Maddison's GDI per capita estimates for the territory of the former USSR. Concretely, it means that the democracy score for Russia in (say, 1910) that strictly speaking applies also to the territories of today's eastern Poland and Finland (which were parts of the then Empire) are combined with income data that cover only the territory of the USSR (that is, exclude parts of today's Poland and Finland). Even more complicated is the case of the former Yugoslavia. Maddison provides data for the territory of the former Yugoslavia going back to 1870. But over

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[45] There is an ironic twist in the Korean data. Maddison's uninterrupted income series for Korea begins in 1911 a few years after the country was annexed by Japan and as PolityIV series is interrupted. Thus both income and democracy data are available only for the years after 1948 and at two data points in the 19th century.

this territory, only Serbia was an independent state and as such is included in PolityIV database. Thus, Serbia's Polity scores for the period 1830-1914 are applied to a per capita income that, in principle at least, covers a wider space. During the period 1918-1991 when Yugoslavia existed, Polity and Maddison coverage coincide. They are also consistent after the Yugoslav break-up in 1991 since both democracy and income data refer to the five successor states.

No dominant country. When two or several countries go through the UDU or DU process, and there is no obviously dominant country, the only data we use are those that refer to the unified country. Thus, for example, Maddison's data on unified Vietnam's income (within current borders) cannot be meaningfully paired with either South Vietnamese or North Vietnamese democracy scores between 1955 and 1975. (These scores, by the way, are quite different: South Vietnamese are -3, North Vietnamese range from -9 to -7). The situation is the same with countries that were unified to form Italy in 1861 or with North and South Yemen, unified in 1990. As a result, for Vietnam we use income and political data for the years after 1976 only, for Yemen for the years after 1990 only, and for Italy for the years after 1861 only. This entails almost no loss of information regarding Italy since Maddison gives GDI per capita for only two years prior to 1861; such a loss however exists for Maddison's income data for Vietnam and Yemen that are continuously available from 1950 onwards but which cannot be "paired" with any PolityIV scores on democracy. The main reason for this "informational loss" is non-uniformity of democratic experiences among countries which later

combine into a single whole[46] and which, prior to unification, are of broadly equal (GDI or population) size. This in turn means that none of them can meaningfully impart its democracy scores to the whole, that is, be paired with income data that refer to the whole country.

Finally, countries whose population is less than 500,000 and for which PolityIV does not provide data are not included in the regressions even if Maddison's GDI per capita data are available. They are Cape Verde (population in 2000, 400,000), Sao Tome and Principe (160,000), Seychelles (80,000).

Independence (colony) and empire variables

Independence variable takes values 0 and 1. For all countries that are members of the inter-state system as defined by the Correlates of War project independence is coded 1 (of course, only for the years when they are members of the inter-state system because countries do enter and exit the inter-state system). For countries that are not members, independence variable takes value of 0. However, among the latter, we have made three exceptions.

First, countries that have been independent prior to joining the inter-state system are considered independent throughout. This applies (as mentioned in the main text) to countries such as Japan, China, Thailand, and Iran that joined the inter-state system relatively late (1860

[46] Obviously if the countries had the same democracy scores the problem would not arise: either country could be "paired" with income data that refer to the whole unified country.

for Japan and China, 1855 for Iran, and 1887 for Thailand) although they were independent throughout the 19th century. The same rule applies to a number of other countries. Here are few examples. Liberia was independent although not in the nation-state system (enters it in 1920); Ethiopia (independent throughout the 19th century but enters the system in 1898), Madagascar (independent in the 1800's prior to the French conquest but enters the system in 1950 only) Afghanistan (enters the nation state-system 1920 but independent before), Nepal (1920), Oman (1971). Similarly, a number of Latin American counties are coded as independent from the year of their actual independence, achieved generally in the early 1820s, rather than from the year when they joined the inter-state system (Argentina in 1841, Chile in 1839). Korea enters the inter-state system in 1948 but is treated as independent before Japanese conquest in 1905. [47]

Second, for the Commonwealth's self-governing territories which, although without formal independence (Australia, Canada and New Zealand, South Africa until 1920) we code independence variable as 1. The same applies to Finland (part of Russia between 1809 and 1917) because of its social and economic autonomy and also Norway (part of Sweden up to 1905) which anyway has *polity2* scores separate from Sweden. [48]

[47] For the coding of the first year of colonial occupation in Africa we also used Wesseling (1996, Appendices 1 and 2).

[48] Separate *polity2* scores start only with independence for Finland, and in 1901 for Australia and 1910 for South Africa. New Zealand and Canada are rated since the mid-1800s.

The third exception applies to the countries that were (i) broadly equal partners, and (ii) had largely economic policy-making autonomy in an union that was later dissolved. They too are assumed to have been independent during the entire period of the union. Thus, both Austria and Hungary are considered as independent throughout the whole period (but not Czechoslovakia or Slovenia, for example). Also Syria is considered the same as Egypt during the two years (1959-60) of the United Arab Republic, and Bangladesh (1950-1972) is considered as an equal partner in the union with Pakistan.

We thus have the following situation:

(1) When a country is a member of the inter-state system as coded by Correlates of War project, it is coded as independent =1.

(2) Countries that are not members of the inter-state system and do not fall under the three exceptions listed above are treated as independent = 0.

(3) If a country is listed as independent = 0, then it must be a colony, that is, it must be "allocated" to a metropolis (empire). This is always true except in a few cases listed below where a non-independent country is not allocated to a colonial power.

These exceptions are seven. They are Ireland (1820-1920), Puerto Rico (in the Maddison's data base since 1951), Palestine (1850-2000), Austria (1938-1944), Czechoslovakia and Poland (both before 1918) and Belgium (before 1830). They are neither considered colonies nor independent countries. What is special in all these cases is that the countries although not independent (in the sense of being self-governing) and not equal partners in the unions were either incorporated into the

larger wholes (e.g. Austria), given distinct administrative status (like Puerto Rico) and were thus not treated as colonies. To see that, compare the position of Austria (an integral part of *Gross Deutschland*) with the Netherlands also occupied by Germany during World War II; or Belgium (before 1830) with Indonesia, or Ireland with India. [49]

It needs also to be mentioned that Germany, Japan and Austria are considered as independent even during the Allied occupation after World War II; but not so European and Asian countries conquered by Germany and Japan between 1939 and 1945. [50] This is because in terms of freedom to conduct domestic economic policies, the two occupations were quite different. For the same reason Hong Kong after 1997 (reincorporation into China) is treated as independent.

Finally, note the relationship between the independence, colony and *polity2* variables. Obviously if independence = 1, *polity2* variable must be available (unless the country is in transition, civil or international war). When independence = 0 and country is a colony then we expect that *polity2* will be missing (there is no national polity). However, there are certain countries and years (listed in Table 1) where *polity2* data are available while the countries are scored as independent=0 and are treated as colonies. These were typically the transition periods during which

[49] None of these countries is coded by Polity during the years of its non-independence.

[50] The exception is France which through Etat Francais, although under the German tutelage, continued its existence as a country. Likewise China, despite being in part conquered by Japan, is considered independent throughout. In both cases, there was a functioning national government even if the territory over which it ruled was smaller than before.

countries were not officially independent but have gained a measure of self-governance.

Table 1. Self-governing territories without formal independence but with separate Polity codings

Country	Number of years	Period	Colony of:
Dominican Republic	17	1844-60	Spain
Egypt	15	1922-36	UK
Haiti	16	1918-33	US
Indonesia	4	1945-48	Netherlands
Iraq	8	1924-31	UK
Jamaica	3	1959-61	UK
Lebanon	3	1943-45	France
Libya	1	1951	Italy
Morocco	1	1912	France
Peru	3	1821-23	Spain
Philippines	8	1935-45	US/Japan
Rwanda	1	1961	Belgium
South Korea	5	1906-10	Japan
Sudan	2	1954-55	UK
Syria	2	1944-45	France

Empires. There are 13 empires listed in Table 2 with the number of countries/years under their rule and average colonial population under their "control" between 1850 and 1950. [51]

Table 3 summarizes the merger results of the three large data bases: Madison's with its GDI and population numbers, PolityIV with its democracy scores, and Correlates of War with its country status data. In the regressions, where we need country/years with all four types of observations we can use shaded cells which yield almost 8,900 data points. Our "real" loss due to the unavailable GDI data is composed of cells (1,4), (1,5) and (1,6), that is of slightly less than 1,300 data points.

[51] Russia is not included among the colonial powers because the Asian territories it conquered were never legally colonies.

Table 2. Size of empires

Metropolis	Number of colonial country/years (in the database)	Average population of colonies between 1850 and 1950 (in million)	Average population of the metropolis between 1850 and 1950 (in million)	Colonial population as percent metropolis' population
Great Britain	1,552	346	40	865
France	986	49	40	123
Portugal	126	6	6	100
Spain	216	5	20	25
Germany	61	2	53	4
United States	116	6	81	7
Ottoman Empire	594	6	17	35
Netherlands	128	42	6	700
Japan	148	12	49	24
China	91	0.4	43	1
Belgium	34	10	7	143
Italy	84	2	34	6
South Africa	75	0.4	7	6

Note: country/year is each year that a given country was colony.

Table 3. Combining Maddison, PolityIV and Correlates of War data 1820-2002

	GDI per capita (and population) data available			No GDI per capita data (population available)		
	(1)	(2)	(3)	(4)	(5)	(6)
	Country in the state system	Country not in the state system but independent	County not in the state system and not independent	Country in the state system	Country not in the state system but independent	County not in the state system and colony
(1) Polity data available	8649 observations	212 observations Australia (1901-1919), Canada (1870-1919), Gernany (1945-49) etc.	45 obs. (Austria 39-49), Philippines (1935-40), Bangladesh (1950-72)	Countries with unavailable GDI data: 1010 observations (Afghanistan 1920-49), Argentina (1841-99) etc.	Generally "non-Western" independent countries with unavailable GDI data 164 observations (China 1822-59), Haiti, Japan (1821-59), Morocco (1821-46) etc.	62 obs. Generally occupied couuntries but with democracy data (Czechoslovakia 1940-44), Haiti (1919-33), Indonesia (1945-48)
(2) Polity data not available	63 obs.; generally countries at, or after wars	158 observations (Australia 1846-1900), Finland (1820-1915) etc.	1112 obs. Colonies with GDI data (Angola, India, Indonesia, Hong Kong, Cameroon Zimbabwe etc)	Countries with unavailable GDI & democracy data, or at war: 108 obs.; (Switzerland 1821-47, China 1860-61) etc.	126 observations Dominican Rep. (1821-24), Argentina (1820)	605 observations Colonies with no GDI and democracy data

Note: For the exact definition of independence see the text.
Applies only to countries with more than 500,000 inhabitants.
Shaded are country/years used in the regressions where (i) GDI, (ii) democracy, (iii) population, and (iv) country status data are all available.

Annex 2. Results of regression (1) run over averages for non-overlapping five-year intervals, 1870-2000

	I	II	III	IV	V
Depend. var.	ROG_{it} if indep=1	ROG_{it}	$ROG_{it}-ROG_{wt}$	$ROG_{it}-ROG_{wt}$	$ROG_{it}-ROG_{wt}$
Initial GDI per capita	-0.013 (0)	-0.021 (0)	-0.014 (0)	-0.014 (0)	-0.014 (0)
$\ln(n_{it}+\delta+\lambda)$	-0.030 (0)	-0.034 (0)	0.005 (0.299)	0.005 (0.322)	-0.007 (0.206)
Polity2	0.001 (0.018)				
Ln (GDI per capita)* Polity2	-0.00008 (0.116)				
Polity2_world mean	-0.002 (0.002)	-0.001 (0.022)			
Regime durability	0.000001 (0.989)				
War	-0.027 (0)	-0.029 (0)	-0.034 (0)	-0.034 (0)	-0.035 (0)
Communist	0.018 (0.01)	0.017 (0.025)	0.003 (0.716)	0.003 (0.731)	0.011 (0.197)
World average tariff rate 1/	-0.001 (0)	-0.002 (0)			
Independence		0.010 (0.005)	0.010 (0.011)	0.009 (0.022)	
Empire		-0.00003 (0.439)	-0.0001 (0.259)	-0.00005 (0.263)	-0.0001 (0.252)
Colonial wars				-0.016 (0.219)	-0.024 (0.057)
English colony					-0.011 (0.069)
French colony					0.0008 (0.926)
Portuguese colony					0.024 (0.053)
Spanish colony					-0.028 (0.361)
US colony					-0.008 (0.707)

Dutch colony					-0.020 (0.288)
Japanese colony					-0.084 (0)
Belgian colony					0.008 (0.714)
Italian colony					0.002 (0.97)
South African colony					0.003 (0.911)
Constant	0.041 (0.048)	0.084 (0)	0.115 (0)	0.115 (0)	0.090 (0)
No of obs. R-squared	1652 0.0867	1949 0.1108	1929 0.0488	1929 0.0497	1903 0.0677
F value	15.69 (0)	27.67 (0)	15.06 (0)	13.13 (0)	7.83 (0)

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Say why adding continrents does not make sense: econmetrically, identification unclear; substantive, unclear what it represenmts (Jordan vs. Japan, Lybia vs. South Africa)

For example, the influential paper by Renelt and Levine that looked at robustness of growth regressions seldom has more 100 observations in any one regressions. The number of observations ranges between 60 and 70. Peerotti (1996) who similarlrly wrote a much-quoted paper on the relationsghip between democracy, growth and institutions, unabashedlty empirical anmd whith thje subtiotle "What the data say" never uses more than 67 observations (county averages). The entire recent literature on institutions and growth (both in the affirmative and in the negative way) is based on between 50-60 data points per regression

Add a graph of growth rates if polity2=10 fct of income and controlled for all other variables

Comments at Syracuse

Add aslso analysis of exit from democracy incomes

Transitional states: 3 categories (entry incomes., exit incomes, those that go back and forth).

Do the same thing as I have done in the paper with non-paarametric analysis but with +1 or +3 increases in democracy index (jumpin democracy rathger than level of democracy onluy). That is, look at the distribution of changes and no of levels.

Give a list of country/years for Polity2>8 entry incomes. {Pethaps their number is small and the sensity curves are irrelevant (since bance on a small sample size).

What is key focus of the paper?

Make more clear that the effet of Communism is after afjusting for the effect of democeacy level.

Epstein-Bates binary variable (which one? Democracy?)

Period effect of democracy: is democracy in 1850 the same as in 1950? Check the US democracy index for before 1865.

Is Polity2 treally executive constraint variable? I don't think so: there is an exdecutivdde clknstraint + this is Wacziarg's varibale.

The paper rejects dyotic view of democracy vs. non-fdemocracy: emphasize this point more

Emphasize that the monotonic relatikonship in the case of rejectioon of P';s hypothiesis is important (not a fluke).

What to do with exit incomes? Przeworsakiu emphasizes that too.

Should I tst both {Przewoprtski and lipste hypitjhesis. Curentl;y I am tesying Przeworski onky. But both Hypitheses could be wreomg.,

An intreprewation of the lack of effect of coloinialism is that bad coplonial effects do not go away. Similar to Acemogku Robinson point on the role of colonialism. The effect lingers on.