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# VOTING UP? THE EFFECTS OF DEMOCRACY AND FRANCHISE EXTENSION ON HUMAN STATURE

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# Voting Up?
# The Effects of Democracy and Franchise Extension on Human Stature[1]

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**Abstract:** We study the welfare effects of the spread of democratic institutions and the extension of voting rights in 15 European countries since the middle of the nineteenth century. We exploit within-country variation in average height by birth cohort in conjunction with a new instrumental variable strategy, alongside an event study. We find robust evidence of an effect of the expansion in the quality of democracy on human stature. We estimate that the transition to democracy increased average male heights by 0.7 to 1 cm, equivalent to a one-decade average increase in stature across cohorts. Including the extension of the franchise to women, increases the effect on average stature to about 1.7 cm. The effect is driven by the influence of political participation and contestation on equality and access to health services. Our results are robust to a range of additional statistical tests.

**Keywords:** height, democracy, transition, voting rights expansions, franchise, inequality, political contestation.
**JEL codes:** H1, J18

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# 1 Introduction

It is well known that rising living standards, reduced exposure to disease and better public services generate improvements in health and human stature (Fogel, 1994; Steckel, 1995, 2009). However, such effects are underpinned by deeper political and institutional transitions, such as the spread of democracy. For example, Deaton (2013, p.98) writes:

> *"Whenever health depends on collective action—whether through public works, the provision of health care, or education—politics must play a role. In this case, the (partial) removal of one inequality—that working people were not allowed to vote—helped remove another inequality—that working people had no access to clean drinking water."*

In democratic countries, collective decision-making results from aggregating preferences and interests of wider social groups. This in turn provides pathways for ordinary citizens to challenge powerful and privileged elites to bring about permanent change (Acemoglu and Robinson, 2006; Deaton, 2013; Weil, 2015). Democracy can strengthen accountability and representation, making welfare reforms more likely (Besley and Kudamatsu, 2006; Norris, 2012), as well as shaping pro-poor fiscal policies (Aidt et al., 2006). Consistently, Gradstein and Milanovic (2004) conclude that voting franchise restrictions are associated with inequality, and that franchise expansion, especially to include females, can give rise to more significant redistribution. There is evidence that democracies produce fewer famines and less deprivation (Siegal et al., 2004), a phenomenon coined as 'fit through democracy' (Sen, 1999). Some contributions also suggest that advancing democratic rights enhances the feeling of having choice and control over one's life (Frey and Stutzer, 2000; Inglehart et al., 2008).

In this paper we study the effect of democratic reforms on the average height of males aged around 21 in fifteen Western European countries over more than a century. Height is a key marker of conditions affecting health during childhood. In these countries the spread of democracy was followed by social reforms which extended state capacity beyond the production

of pure public goods. The expansion of basic social services such as health and education, redistribution and social safety nets, and better access to information, could potentially improve health through a range of channels. However, the effect of democracy on health is far from straightforward and democracy alone might not necessarily address the needs of the poorest (Krueger et al., 2015). For instance, democratic institutions may be captured by a dominant elite, with clientelistic support from the middle class (Powell-Jackson et al., 2011). Hence, the effect of democracy on health and well-being depends on how widely it spreads political accountability (Chapman, 2018) and on the structure of the reforms that it sets in train. Thus the health outcomes of the advent of democracy are ultimately an empirical question and, indeed, existing evidence on the health effects of democracy has been mixed and inconclusive.

Our study has several strengths in relation to the existing literature. First our dependent variable, average male adult height, has been used as a key indicator of well-being in a variety of historical studies (Steckel, 2009; 2013). It is an absolute measure that is not subject to changing definitions over time or between countries, and it provides a straightforward interpretation of the quality and quantity of health gain implied by democratic transition. It is also sensitive to conditions during childhood, specifically the quantity and quality of nutrition and the disease environment (Silventionen et al., 2003; Steckel, 1995; 2009) [2]. Behind these proximate determinants lie a range of economic, social and psychosocial conditions that could be directly or indirectly influenced by the advent of democracy. Because height is determined during childhood, and especially early childhood, by using five-year cohorts and aligned by birth period, the timing of any effect is more precise than it would be for measures such as life expectancy, where the health gains may depend on conditions at different stages of the life cycle. Height is also correlated with a number of health outcomes later in life and is, in turn, positively associated

[2] Although most of the variation across individuals is genetic, (Silventoinen et al., 2000) this disappears when comparing means. Also, male heights tend to be more sensitive than females to changes in environmental stress and nutritional supplementation (Stinson, 1986).

with employment, earnings and occupational attainment (Case and Paxson, 2010; Currie, 2009; Weil, 2007, 2014).

Second, our empirical setting is Europe from the 1860s to the 1970s, a period over which the average height of adult males increased by 11cm (Hatton, 2014) and during which there were significant advances in democracy. For this era, we use several measures of democracy that are taken or constructed from different sources. This allows us to disentangle the contribution of institutions influencing collective decision-making from the role of voting rights extension, which adds weight to the preferences of previously neglected groups such as women and poorer sections of society (Bhalotra and Clots-Figueras, 2014; Chattopadhyay and Duflo, 2004). The extension of the franchise to women is a key feature in the advance of democracy and is typically associated with a range of civil rights improvements (Wang et al., 2017). Female enfranchisement has been shown to increase government size (Lott et al., 1999) and particularly, to be correlated with the advent of the welfare state in many European countries (Abrams and Settle, 1999). We test whether these developments had significant implications for the welfare of children as reflected in their adult heights.

Third, we adopt an empirical strategy that addresses a criticism of previous studies. Acemoglu et al. (2015) argue that diversity in the existing findings can be related to failure to control consistently for country fixed effects, which undermines the causal interpretation of the link between democratic transitions and health outcomes. As we have data on five-year birth cohorts for over a century, we use period and country fixed effects as well as lag between democracy and height. And we can also account for democratic reversals. But our estimates could still be biased due to unobserved and time-varying heterogeneity, even though such variables (e.g., cultural norms, generalised trust, and tolerance) are likely to produce attenuation bias in the coefficient of interest. So, as an alternative, we augment this baseline model using an instrumental variable strategy, consistent with the recent literature on the effect of democracy

on income and growth (Acemoglu et al., 2019; Madsen et al., 2015; Persson and Tabellini, 2009). This is achieved by using a novel instrument that rests on the differential timing of decolonisation processes among European coloniser countries (Coppedge et al., 2016).

Finally, like many other studies, our baseline estimates can be interpreted as reduced form effects, which do not specify channels of transmission. Although historical data is limited, we can nevertheless examine several potentially important channels through which democracy might be expected to operate and on which previous research has speculated. These include the reduction of inequality that results from democracy, and especially, the expansion of public health services as well as infrastructure improvements. We explore the links between democracy and these intervening mechanisms, as well as the links between each of the mechanisms and height. Related to this, we might also expect to observe heterogeneity in the effect of democracy on health and height. We therefore explore possible heterogeneity in the effect, between countries, over time, and across different facets of democracy.

Our results, using fixed effects and instrumental variables, together with a range of robustness checks, establish strong evidence, over more than a century, of a positive, and plausibly causal, effect of the advent of democracy on average male adult height. We show that the transition from autocracy to democracy is responsible for an adult height increase of about 0.7 cm which is 6.4% of the total increase in height over the century from 1860 to 1980. Even more importantly, when we include the effect of extending voting rights to women, we consistently find larger effects on heights, up to 1.7 cm or about 11% of the total increase. These results also hold when we instrument democracy; indeed, its effect on height increases in size, remains strongly significant and is robust across different specifications. Exploring the intervening mechanisms, we find evidence that democracy improved health through reducing inequality and expanding health services. But, surprisingly, we find little variation in the effect of democracy on height across European regions or between historical eras.

The rest of the paper proceeds as follows. In the next section we summarise the literature on democracy and health-related well-being and emphasise the advantage of using height as a key indicator. We identify our contribution and explain the originality and distinctiveness of our analysis. Next, we describe the dataset and set out our estimating framework. We then report ordinary least squares (OLS) and instrumental variables (IV) estimates obtained using different measures of democracy and provide various robustness checks. We then turn to exploring the channels of influence and testing for heterogeneous effects. We summarise our results and draw implications in the concluding section.

# 2 Democracy and Well-Being

*2.1 Democracy and Health Outcomes*

The relationship between democracy and health has been documented in a number of empirical studies. Democracies entail distinct mechanisms of collective decision-making, which give rise to different public preferences.[3] However, the association between measures of democratic quality and different physical well-being has been examined in a range of studies. A literature review by Muntaner et al. (2011) found that 21 studies out of 26 reported a positive association between democracy and some measure of health, mostly using infant/child mortality and life expectancy, yet none of them provide causal evidence of an effect[4]. In one example, Besley and Kudamatsu (2006) report a positive association between life expectancy and democracy across countries from the 1960s to the 2000s. However, life expectancy is sensitive to the history of the health environment, which raises issues about the timing of such effects. To address such concerns, Lin et al. (2012) focus on the dynamic effects of democracy on life

[3] This is in part because the advent of democracy may be associated with greater investment in skills and other resources that, in turn, influence preferences (Brady et al., 1995).
[4] Other studies that focus on life expectancy include Franco et al. (2004), Safaei (2006) and Wigley and Akkoyunlu-Wigley (2011), while Klomp and de Haan (2009) use a composite health indicator.

expectancy in annual panel data for 119 less developed countries for 1970 to 2004. Controlling for GDP per capita, the literacy rate and food deficiency, they found the impact effect of democracy to be small, although it increases in size and becomes more significant over the full life cycle. Such results point to the importance of examining early life influences where changes in the social environment are likely to have the greatest influence.

Evidence of the effects of democracy on early-life health is far from robust. While, Zweifel and Navia (2000) document a strong association between *measures of democracy* and infant mortality, other research reports that health is determined by specific interventions rather than directly by democracy (Burroway, 2016). A few contributions examine *transitions to democracy*. Ross (2006) finds that the effects of democracy on infant and child mortality are sensitive to the selection of countries and to the inclusion of country fixed effects. In contrast, comparing siblings born before and after democratic transitions Kudamatsu (2012) finds that transitions to democracy reduce infant deaths in subsaharian Africa. Another set of studies draws on the evidence from changes in *female political empowerment*. Examining a panel of US states from 1900 to 1936, Miller (2008) found that female enfranchisement led to immediate increases in state and local expenditure on health and social services and it substantially reduced the mortality rates of young children. Other studies also find that female political empowerment has significant positive effects on child health (Bhalotra and Clots-Figueras, 2014; Chattopadhyay and Duflo, 2004; Swiss et al., 2012; Varkey et al., 2010). However, we know little about whether these insights apply to historical democratisation in Europe.

### *2.2 Environmental Effects on Height*

With relatively few exceptions, the literature has not explored the effect of political transitions on human heights. Unlike infant or child mortality, height reflects the childhood circumstances on those that survive; hence, it captures a broader spectrum of conditions

operating through multiple channels that are affected by democratisation.[5] Komlos and Kriwy (2003) found convergence in male heights between East and West Germany following reunification, and Costa-Font and Gil (2008) found that the height-gap in Spain narrowed after its transition to democracy.[6] Pak (2004) found that the heights of South and North Koreans have diverged by 6 cm since cohorts born before the division of the country. However, to the best of our knowledge we are the first to exploit a long-run time series (1860-1980) for heights and democracy in Western Europe in order to assess the effects of past transitions to democracy in a set of developed countries.

It is important to identify the mechanisms underlying the height-democracy association. Transitions to democracy may involve overthrowing the pre-existing elite and abolishing extractive institutions (Acemoglu et al., 2006), which may influence health (Krueger et al., 2015; Powell-Jackson et al., 2011). However, the threat of revolution may induce more incremental change (Aidt and Jensen, 2014). As democracy takes root, and as the franchise widens, voting rights typically percolate down the hierarchy of social class and income. This might lead to redistributive policies, either because the position of the median voter changes (Meltzer and Richard, 1981), or because democracies are better at mobilising the demand for private transfers, social services and social insurance (Keefer and Khemani, 2005). Redistribution alone could increase physical well-being overall and not just for the poor at the expense of the rich.[7] Ultimately, whether democracy-induced redistribution improves the health of the average citizen is an empirical question.

[5] Changes in the health environment during childhood could have two opposing effects on height: selection and scarring (see Bozzoli et al. 2009). The selection effect is where improved conditions increase the survival rates of more vulnerable, and possibly shorter, individuals. The scarring effect is where improved conditions enhance growth during childhood. For Europe, scarring effects seem to dominate (Hatton, 2011; 2014). Here we estimate the net effect.

[6]

[7] If the health production function is concave as is often suggested (Easterlin, 1999, p. 259; Preston, 1975; Steckel, 1995, p.1914) then redistribution from rich to poor (with no change in average income) should improve average health outcomes.

*2.3 Other Mechanisms*

*Development and Infrastructure.* There is overwhelming evidence that higher incomes and better health infrastructure, such as sanitation, clean water and access to improved medical services, had substantial effects on health (Chapman, 2019; Cutler and Miller, 2008; Kesztenbaum and Rosenthal, 2017). It is important to recognise that if democracy affects health and height only through income and infrastructure then, in empirical applications, the effect of democracy may disappear once such proximate effects are accounted for. The studies that reject the idea that democracy affects health often include controls for (some of) these variables. So, what they are finding is that there is no additional effect of democracy over and above those that run through improvements in living standards and better health facilities. In practical terms, the observed effect of democracy is likely to depend on the degree to which such intermediate effects are controlled for.[8] Thus, it is essential to compare conditional and unconditional effects of democracy on health as this provides evidence of the mechanisms through which democracy affects health. Conditioning on GDP per capita may be necessary as some studies, following Lipset (1959), have found a positive correlation between income per capita and democracy, although more nuanced approaches fail to find evidence that income influences transitions to democracy (Acemoglu et al., 2008; Przeworski et al., 2000).

*Health Information*. It is far from trivial to account for the myriad of ways in which widening democratic accountability facilitates access to better nutrition and an improved disease environment, particularly among the poor. One example would be that greater accountability improves the quality and the targeting of health-related infrastructure and not only the quantity of, or expenditure on, health services (Lake and Baum, 2001). The health environment may also be improved by greater transparency and a free flow of information via

[8] For example, one study of 153 countries from 1972 to 2000 finds that the positive effect of democracy is halved in the presence of controls for health expenditure, education and calorie consumption (Wigley and Akkoyunlu-Wigley, 2011).

the press (Ruger, 2005). As noted by Sen (1999), this is often a corollary of the advance of democracy. In the nineteenth century, and more recently in developing countries, such information could be as basic as rudimentary knowledge of nutrition and hygiene.

*Stability.* It is possible that democracy improves health by altering behaviours not only through access to information but also by shaping incentives. This could arise through reducing uncertainty from corruption and arbitrary exaction (Kolstad and Wiig, 2016), as well as by providing a social safety net. Longer time horizons and greater opportunity could affect fertility decisions, fostering a transition towards reduced family size and greater investment in child quality. Even beyond this, there may be effects on health due to psychological and psychosocial processes that affect health individually as well as through the accumulation of social capital (Kristenson et al., 2004). This would be consistent with, Sen's (1999) notion of a constructive role of democracy in generating self-esteem and self-determination as well as in the formation of pro-social values, and with the idea that autonomy can improve well-being and successful collective action (Frey and Stutzer, 2000).

# 3 Empirical Strategy

### *3.1 Endogeneity of Democratic Rights Extension*

Country-level studies often treat democracy as an exogenous determinant of health. But as recognised by Lipset (1959) and many others since, the inception of democracy is influenced by a number of other variables. Income per capita or education attainment is associated with the advent of democracy, although these effects are contentious (Acemoglu et al., 2008; Bobba and Coviello, 2007; Gundlach and Paldam, 2009; Moral-Benito and Bartolucci, 2012).

To identify the effect of democratic rights expansion, we use two-way fixed effects (2WFE). By including country fixed effects, we control for time invariant omitted variable bias such as the historical legacies of each country which influence human stature. Period-specific

fixed effects control instead for common factors across countries in a given period. However, 2WFE fails to control for time-varying omitted variables correlated both with treatment assignment and outcome determination, which could bias the coefficient estimates. Existing studies on the effects of democracy on health often expand on the list of controls in order to reduce the problem of omitted variable bias. However, the addition of such controls can attenuate the effect of democracy and the inclusion of all possible omitted factors is likely to be unattainable. Therefore, in order to obtain unbiased estimates of democracy and voting rights extensions on well-being, we follow an empirical strategy exploiting exogenous variation in measures of democracy. In what follows (sub-section 3.3), we will address this problem by using an instrumental variable (IV) approach, based on using a strong and valid instrument, that produces a source of exogenous variation on the impact of democracy on heights. This allows us to produce causal estimates that can be interpreted as the local average treatment effect (LATE) of democracy on heights.

### *3.2 Two-Way Fixed Effects and Instrumental Variable Estimates*

Our baseline specification can be expressed as follows:

$$H_{it} = \beta_1 + \beta_2 D_{it} + \boldsymbol{\beta_3'} \boldsymbol{X_{it}} + \pi_i + \tau_t + \varepsilon_{it} \quad (1)$$

$H_{it}$ is average adult height in country $i$ for individuals born at time $t$, where $t$ is an interval of five years. The explanatory variables are aligned with the cohort birth period. $D_{it}$ refers to different measures of democracy for country $i$ at time $t$ and its coefficient, $\beta_2$, measures the treatment effect. $\boldsymbol{X_{it}}$ is a vector comprising three controls: (i) the infant mortality rate, with coefficient $\beta_{31}$, (ii) the log of GDP per capita ($\beta_{32}$), and (iii) average years of education of the parents' generation ($\beta_{33}$). These variables are widely used in the literature and are intended to capture, respectively: the overall disease environment, access to basic needs and nutrition, and

child-rearing capabilities. More detail on the sources and measurement of these variables is provided in Section 4. $\pi_i$ is a country fixed effect and $\tau_t$ refers to a time fixed effect. As already noted, this aids identification by controlling for non-varying factors both between countries and over time, which might affect jointly the assignment of the treatment and the determination of the outcome. Finally, $\varepsilon_{it}$ is the unobserved random error.

First, we explore the association between heights and democracy using ordinary least squares estimates of equation (1) to identify any association and to see if it is robust. We estimate the coefficient $\beta_2$with and without $\boldsymbol{X_{it}}$ included. As a second step, and to overcome the endogeneity problem, we employ an instrumental variable (IV) strategy, estimating at the first stage the following equation for the index of democracy:

$$D_{it} = a_1 + a_2 Inst_{it} + \boldsymbol{a_3}'\boldsymbol{X_{it}} + \theta_i + \delta_t + \mu_{it} \qquad (2)$$

where $Inst_{it}$ refers to a time varying instrument for democracy in country $i$ at time $t$, and $\theta_i$ and $\delta_t$ are country and time fixed effects. We note that, by having a time-varying instrument, we can exploit the joint identification power of the FE and IV approaches. We also estimate the reduced form:

$$H_{it} = \gamma_1 + \gamma_2 Inst_{it} + \gamma_3 \sum_{k=1}^{2} \kappa_k Inst_{it+k} + \boldsymbol{\gamma_4}'\boldsymbol{X_{it}} + \rho_i + \sigma_t + \epsilon_{it} \qquad (3)$$

where $\gamma_2 = \alpha_2\beta_2$ and $\gamma_{4j} = \beta_{3j}(1 + \alpha_{3j})$, and where $j = 1,2,3$ represents the three control variables used throughout. The term $\sum_{k=1}^{2} \kappa_k Inst_{it+k}$ adds forward values of the instrument, which will be included in the regressions to test the robustness of the reduced form transmission effect $\gamma_2$. As shown, this measures the composite effect of the first-stage selection into treatment, $\alpha_2$, and the second-stage, main causal effect of interest, $\beta_2$. As placebos, we would expect these leading indicators not to account for the transmission channel and so $\gamma_3$ should be insignificant.

We limit these to two forward values, capturing up to 10 years forward, in order to retain a reasonable sample size.

Although our focus is on these specifications, we enrich the analysis in three ways. One is to explore different indices of democracy, including measures of the voting franchise. Another is to assess the effects of democracy in the presence of other variables (gross versus net effects). Third, we examine possible channels of influence or mediating factors through which democracy affects height.

### *3.3 Validity of the Instrumental Variable Strategy*

Our instrumental variable (IV) strategy takes advantage of the plausibly exogenous effect of the change in the country's colonial territory on voting rights extensions and democratisation more generally.[9] That is, we claim that the effect of freeing colonies influenced heights in the coloniser countries only through democratic reforms that took place subsequently. Imperialism provided little incentive for domestic democratic reform, this is because democratic rights were commonly denied to the populations of the colonies. The extensive bureaucracy required to control and manage an empire, also tended to concentrate political decision-making in the metropolis, something that supported the domestic dominance of economic and financial elites (Centeno and Enriques, 2010). In Britain, imperialism underpinned the consolidation of a liberal-conservative state and it influenced attitudes to government at home.[10] Thus, the exploitation of overseas territories imposed constraints on the extension of political rights to the home population, sometimes by force, with the result of undermining support for democratic reforms. Indeed, the evidence suggests that democracy advanced more slowly in colonisers than in other rich countries without colonies (Coppedge et al., 2016). Furthermore, Gartzke and

[9] Our preferred estimates will use the natural log transform of the 10 years average of colonial territory before democratization as the instrument, see section 4.5 below.

[10] According to Thompson (2005, p. 149): "the empire affected how the British chose to govern themselves. It did so by providing a spur to theoretical reflection on the proper powers and purposes of the British state."

Rohner (2011) find that colonialism does not depend on democracy so there seems to be no reverse causation.

During the 20th century, the complexity and cost of maintaining colonies increased as nationalist movements gained strength, not least as a result of the involvement of colonial troops and resources in two world wars and their subsequent demobilisation (Kitchen, 2017; Shipway, 2008, Ch. 3). Decolonisation became more pressing as colonies became progressively more complex and expensive to maintain due to irredentist movements, geopolitical rivalries and international conflicts (Cooper, 1997; Thomas et al., 2008). At the same time the strategic value of colonies diminished, and the rising hegemony of the anti-colonial United States intensified pressures for divestment. Thus external forces raised the costs and reduced the benefits of empire leading to its abandonment, in the manner suggested by Grossman and Iyigun (1995). Decolonisation allowed the coloniser to disclaim responsibility for the colonised (Galbraith, 1994) and this helps to explain the close association between progressive movements' political clout and decolonisation. Hence, the end of the colonial rule was an important step towards a more fundamental and lasting transformation of the socio-political order.[11]

It seems unlikely that losing territories abroad would have any direct effect on health and heights in coloniser's countries, but only an indirect impact via the coloniser's political system or regime. But a possible consequence of decolonisation could have been to affect per capita GDP, which then influenced the demand for democratisation in European countries. If so, then the effect is likely to have been negative. However, concerns about endogeneity on this account can be dispelled because we are able to control for this backdoor effect directly in the second stage regression. In any case, the evidence suggests that the liberation of colonies caused little economic loss to the colonisers as the economic advantages associated with trade remained

[11] Decolonization also spurred the growth in importance of international organizations such as the United Nations, and the emergence of a regime of international human rights (Klose, 2014).

largely intact after decolonisation.[12] While there could be an effect through other omitted variables, we will also provide an independence test (see Table 3 below), which shows a very weak correlation between the instrument and the controls, and which covers a range of alternative channels.

# 4 Data

*4.1 Dependent variable*

The dependent variable used throughout the paper is a five-year average of heights, measured in cm, of cohorts of men aged around 21, where heights are aligned with the years of birth. These data are from Hatton and Bray (2010) [HB10] and provide an unbalanced panel of 15 European countries for birth cohorts' from1856-60 to 1976-80. The data reveal that, between the birth cohorts of 1871-5 and 1976-80, average height increased by 11 cm, or about 1 centimetre per decade. More detail on heights and the other control variables used in this paper can be found in Hatton (2014) [H14]. Figure 1 shows trends in average height for the 15 countries divided into three geographical groups: (i) southern, (ii) central, and (iii) northern European countries.

**[Insert Figure 1 about here]**

*4.2 Measures of Democracy*

Several measures of democracy have been proposed in the literature, and there is debate over the extent to which they capture the complex and multi-dimensional aspects of democracy. The main divide is between sources that provide (i) continuous/multi-category index values

[12] While there was some cost to loss of control over trade, decolonization delivered savings on direct administration and defense. Colonial relationships were often replaced by less formal arrangements, notably the British Commonwealth, which most newly independent states joined. Hopkins (2006) and Tomlinson (2003) examine the role of the Commonwealth in the years prior to Britain's accession to the European Union in 1973.

measuring degrees of democracy, and (ii) dichotomous measures classifying a country as democratic or not. Sources within the first type include the polity score from the Polity4 dataset (Marshall et al., 2014), while within the second we can count Boix, Miller and Rosato (2013) [BMR13], Alvarez et al. (1996), Cheibub et al. (2010) and Golder (2005). BMR13 has the advantage of covering the longest time span, of improving on the definitions used in the other indices, and of including a minimal suffrage requirement (50% of the male population).[13] Also important for our purpose is that the data sources go far enough back in time.[14] As our data on heights are for the period from 1856-60 to 1976-80, this restricts our options to two main data sources, Polity4 and BMR13. While our main focus is on these, we also utilise V-Dem (version 9), which provides a broader range of features linked with democracy, in order to examine the relative strength of these different facets.

To improve the precision of the index of democracy, and reduce its noise, Acemoglu et al. (2019) propose a method which considers the consistency of classifications through multiple sources and produces a customised dummy variable. By following such an approach, we created a dummy variable (BCFH), which is constructed by combining the two sources, Polity4 and BMR13. Full details about the steps for constructing the index are reported in Appendix I, section AI3, which adopts a conservative strategy in classifying a country as a democracy. Indeed, our methodology runs the risk of considering as non-democratic a country that could have been democratic, while strongly limiting the misclassification in the opposite direction. Overall, this way of attributing the democratic status in the presence of a possible measurement bias should be more vulnerable to the erroneous inclusion of democracies in the control group, which is

[13] The latest version of this index (produced in March 2018) for the years from 1800 to 2018, includes more than 200 countries and provides the new democratization measure that includes female enfranchisement. For a detailed list of the sources, see Boix, Miller and Rosato (2013), Table 1.

[14] As an example, the widely used Freedom House (FH) index is available only from 1972. The Polity and FH indexes differ somewhat in emphasis and coverage, but they are highly correlated (Högström, 2013).

likely to bias *downwards* the postulated positive effect of a health dividend from democratisation.

Finally, to evaluate whether there is a *height premium* from shifting to minimal requirements for democracy to higher standards of democratic quality, we extend our analysis by using a more "demanding" measure of democracy, specifically one that includes female suffrage. This dummy variable is available in the most recent version (3.0) of the BMR data (March 2018). This is a definition of democracy requiring that at least half of adult women have the right to vote. Also, in this case we use the original dummy; call it BMR_F, and its harmonised version BMR_F_A5, calculated by following the same steps for creating the 5-year average of our BCFH measure of democracy.

### *4.4 Other Independent Variables*

Additional controls, taken from H14, include: (i) the log of real per capita GDP (PC_GDP), (ii) the infant mortality rate (IMO), and (iii) average years of education of the parents' generation (PARENT_EDUC). Their definitions can be found in Appendix I, Table AI1.

### *4.5 Instrumental Variable: Colonial Power*

As described above, we exploit the variation in colonial status experienced by European countries in the period covered in our sample. This period captures the bulk of the historical decolonisation process experienced by these countries during the twentieth century. Colonial relationships in dyadic form are from Wimmer and Min (2006) [WM06], and we use them to calculate our instrumental variable as the average from time *t-9* to time *t* of the log of the colonial territory (originally expressed in square kilometres) colonised by each country (AREA_COLONY_A10). This average, covering a period which is ten years antecedent to the treatment variables of interest, allows us to estimate more precisely the selection into treatment

by removing the simultaneity concerns that can arise when using contemporaneous variables.[15] This variable scores zero when the country has no colonial territory as defined. To sharpen the design, we also create a dummy variable for colonial status = 1, otherwise 0 when the country has no colonial territory (COLONIAL_STATUS).[16]

Figure 2 shows the unweighted average across the 15 countries of the colonised area in the preceding ten years. From the 1860s until after the turn of the 20th century the trend is fairly flat, after which it undergoes a steep decline. Also illustrated is the trend in average height for countries that are defined as democracies (BCFH_A5 = 1) and those that are not (BCFH_A5 = 0). As the figure shows, the steep decline in colonised area coincides with a divergence in height between these two groups. However, the overall trends conceal considerable heterogeneity in scale of de-colonisation and the timing of the democratic transition, which we will explore more fully in Section 5.2 below.

[Insert Figure 2 about here]

# 5 Results

*5.1 Baseline Results*

Our baseline estimates exploit the staggered distribution of the democratic transitions for the countries in the sample, and they include country and year fixed-effects. The coefficients are displayed in Table 1 with robust standard errors in parentheses. We focus on two measures of democracy, namely the BCFH and the BMR definitions, using the shortest sample with and without controls. This allows us to avoid the possibility that any differences in the coefficient estimates might be due, not to different definitions, but to varying sample sizes.

[15] We tried also the five-year average measure from *t-4* to *t*. The results do not change appreciably. These results are available on request.
[16] Results reported in Table IIA.1 of Appendix II.

[Insert Table 1 about here]

The upper panel A reports regression results without controls (columns 1 to 4), while the lower panel (panel B, columns 5 to 8) shows the results obtained when including the three additional control variables (PC_GDP, IMO, and PARENT_EDUC). The coefficients in column (1) of panel A indicate that a democratic transition from 0 to 1 of the BCFH dummy is associated with an increase in height of about 0.73 cm, a little less than the average decadal increase in heights. The coefficient is significant at the 1% level. In column (2), where we use the 5-year average dummy (BCFH_A5), we find a slightly larger and significant effect of 0.79 cm. Columns (3) and (4) show the results obtained from BMR (3.0) when using the more demanding definition of democracy. When we focus on the enfranchisement of women, as in BMR_F, this reduces the number cases where countries are classified as democracies because it requires that at least half of the female population have the right to vote. These results suggest evidence of a "quality premium" effect; as women are included in the democracy definition, the effect rises from 0.73 to 1.15 from column (1) to column (3) and the increasing effect, though smaller, is present also when using the averaged dummy variables, with the transition effect increasing from 0.79 cm (column 2) to 0.98 cm (column 4). In both cases, we document a meaningful increase in the size of the coefficients when democratic reforms involve female enfranchisement. However, the latter effect must be interpreted carefully; it is not the effect on women's heights, but rather, the effect of women's enfranchisement on the adult heights of their (male) children.

Panel B of Table 1 includes a set of controls for per capita income (PC_GDP), infant mortality (IMO), and parental education (PARENT_EDU). As expected, GDP per capita and years of parental education both exhibit a positive association with heights, but they are overshadowed by the effect of democracy. In contrast, the coefficient on infant mortality is

negative and highly significant, implying that a reduction in infant mortality has a positive effect on height. This result underlines the importance of the disease environment as an influence on growth during early childhood, which has been the focus of previous studies of average height (Hatton 2011, 2014). As expected, the inclusion of these variables reduces the size of the coefficient on democracy, indicating that some of the effect of democracy comes through its influence on the more proximate determinants of height. However, the democracy effect remains uniformly statistically significant, economically relevant, and positive in sign, as predicted by our hypothesis. Given that both per capita GDP and parental education are not significant, our estimates exhibit a downward bias through the over-specification of the model. Finally, the finding of a health dividend from democratisation is a result consistent with micro-level studies that stress the importance of female empowerment for health and heights (Bhalotra and Clots-Figueras, 2014).

*5.2 Colonial Territory as an Instrumental Variable*

Least squares estimates are likely to be affected by potential unobservables, as well as by confounding effects that influence democracy such as improvement in education, or historical events influencing the persistence of non-democracies. Hence, in this section we consider possible endogeneity, which has often been neglected in this context. First, we provide evidence of exogenous changes in colonial territory on European democratic transitions. However, as noted previously, we use the *area colonised* in place of countries, because the former considers the complexity and gradualism of the decolonisation phenomenon we aim to capture, and this is mainly because colonies were very heterogeneous in size and because we do not have sufficiently reliable measures of population.

We first examine and document the presence of a robust and significant correlation in the reduced form by regressing heights on the continuous version of decolonisation and by adding

all the control variables used in the baseline regressions (Table 2). These differ only in the number of observations associated with the different measures of democracy. We then check the robustness of this relationship by adding forward values of the instrument, as illustrated in equation (3). For each of the three samples involving the BCFH, BCFH_A5 and BMR_F variables, we estimate the baseline least squares regression (i) without controls (columns 1, 4 and 7); (ii) with controls (columns 2, 5 and 8), and (iii) an extended model including forward values (two leads) of the instrumental variable (columns 3, 6 and 9). We have also estimated alternative specifications such as an averaged version of the variable BMR_F, which delivers results similar to those reported in Table 2.

[Insert Table 2 about here]

The coefficient estimates in Table 2, for different samples, indicate that the reduced form tests support the presence of a statistically robust (negative) and significant (always below the 1% level) effect of the combined first and second stage coefficients that we will show in Table 4. They also illustrate that, in contrast to panel B of Table 1, the coefficients on log PC_GDP and PARENT_EDUC become significantly positive. This suggests that democracy is partly a function of these variables, as is often suggested. As a further check, Table 3 reports a series of instrument independence tests. These reveal that the correlation between the instrument and the rest of the control variables used is quite weak and disappears once controlling for lagged values of the instrument. Thus, especially when examining the specifications in columns (5) and (6) and (7) of Table 3, we find that the colonised area AREA_COLONY_A10, used as instrument, is persistent as reflected by the coefficients on the lagged dependent variable.

[Insert Table 3 about here]

We now turn to the IV estimates in Table 4, which reports both first-stage F tests and first-stage coefficients (the full first stage results are provided in Appendix I, Table AI.4). The first-stage coefficient measuring the impact of colonial possessions on democracy is reported in the bottom rows of the table. As expected from the reduced form estimates, it is consistently negative across all the eight specifications, and significant at the 1% level throughout. These results indicate that decolonisation had a substantial impact on the democratisation process. We also include the F-statistic obtained by squaring the t-statistics of the first-stage coefficient on the instrumental variable. In all cases the F-statistics are well above the value of 20, providing evidence of a strong instrument.

[Insert Table 4 about here]

Panels A and B of Table 4 report, respectively, our estimates with and without controls. Starting from Panel A, we find that the IV coefficients exhibit the expected signs and are significant at the 1 per cent level. In columns (1) to (4) we find that the coefficients on democracy are larger than the corresponding OLS estimates in Table 1. The coefficient obtained when using BCFH (column 1) increases from 0.73 to 1.04 (+41%), and the one using BCFH_A5 (column 2) from 0.79 to 1.10 (+39%). We find a similar pattern when using the measures of high-quality democracy. Both the BMR_F dummy and the harmonised measure of high-quality democracy (BMR_F_A5) deliver larger IV coefficients than their equivalents in Table 1.

Panel B presents a similar picture. These estimates confirm a downward bias in the two-way fixed effects models of Table 1, which is larger when including the controls. We also confirm a height dividend from democratisation in the IV regressions, indicating an increase in the coefficient from 1.04 to 1.65 (56% increase) for the non-averaged measures (compared with

columns 1 and 3 of Table 1) and an increase from 1.10 to 1.69 (39% increase) for the averaged measures (compared with columns 2 and 4 of Table 1). Similar premia can be observed in columns 5 and 7 of panel B where the coefficient increases from 0.97 to 1.58 (62% increase), and in columns 6 and 8 (estimated with averaged dummies) from 1.04 to 1.64 (57% increase).

Part of the substantial increase observed can be attributed to being able to pick up only a local average treatment effect (LATE). This could be because the effect is concentrated in a group of particularly sensitive complier countries, while the rest are non-sensitive to the instrumental selection into treatment. However, it is possible that the instrument is also helping to correct the intentional measurement bias that we created when defining our BCFH variables. As documented above, this variable is more likely to classify a democracy as a non-democracy than vice versa. If so, then we are not picking up the full democratisation effect whenever an autocracy that should have been classified as democracy exhibits higher stature. The IV estimation might, at least in part, correct for this bias and confirm that we are estimating a lower-bound of the democratic effect. Overall, our estimates indicate that the spread of democracy, driven by increasing political participation, especially of women, was an important element leading to improvement in physical welfare. However, it is important to examine how sensitive our results are to falsification tests, and what are the likely mechanisms involved. On the latter, democracy might have prioritised the implementation of public health and healthcare programs as well as a reduction of inequality and the diffusion of health information and health knowledge.

### *5.3 Residual Inclusion and Falsification Tests*

In this section we offer three additional checks of our estimates. The first is a test of residual inclusion, and it aims at supporting the validity of the instrument used. We follow a two-step procedure by first regressing democracy on the instrument. In the second step, we include the original democracy measure and the residuals estimated in the first step by using bootstrapped standard errors. If instruments were valid, we would expect the correlation

between heights and the estimated residual (the part of democracy not explained by the IV) to be weak. The results in Table 5 confirm this expectation: three of coefficients are insignificant with only the residual from the BMR_F version of democracy significant at the 10% level.

[Insert Table 5 about here]

The second test is to include forward values of our four measures of democracy. By forward value we mean 20 years forward, (four leads in the 5-year panel) to avoid capturing a possible overlapping effect of the previous cohort. If our inference is valid, then we should find that this does not significantly alter our key results, and the coefficients on the forward values, should then become weakly significant, or not significant at all. The results are displayed in Table 6.

[Insert Table 6 about here]

Consistently, our results confirm the expectation that the forward values are non-significant or weakly significant, except for column (2) where the significance level is 5%. However, the coefficients on the main variables remain large and significant, although about 20% smaller on average than those reported in Table 1. This suggests that it is exposure during early childhood that matters most for adult height rather than conditions during later childhood and adolescence. In Appendix II section H we specify a system IV model and report the results of performing similar tests. There we find that the coefficients on forward values are uniformly insignificant in the IV version.

[Insert Table 7 about here]

Finally, we perform a placebo test using a random assignment of periods for the assignment of a dummy for democratisation for up to three five-year periods before and three five-year periods after the switch to democracy. The resulting coefficients for three dichotomous measures of democracy (BCFH, BMR and Polity) are presented in Table 7 for 1,000 repetitions with bootstrapped standard errors. Even for the narrowest window of two periods before and after, in columns (1) to (3), and for each of the democracy measures, the results show that the placebo coefficients are insignificant and small in magnitude. This result suggests a major discontinuity at the time of the switch to democracy. Nevertheless, there is likely to be some gradualism in the effect, which we now examine.

*5.4 Event Study*

Previous regression estimates report strong support for an effect of democracy on height. Nevertheless, it is unclear whether such an increase in height takes place precisely at the point where a change in the binary version of democracy switches on. We study this by including in the regression a time variable that counts the periods before and after the switch to democracy, using the original BMR binary indicator.[17] Table 8 reports the results with the three control variables included. The first four columns present the results with and without year dummies and with and without country fixed effects. They indicate that there is a distinct break in the trend after the advent of democracy. In each case the coefficient on time before democracy is negative and the post-democracy coefficient is positive and significant at the 1% level. A distinct break can be observed in the presence of the three controls and with both year effects and country fixed effects included (col. 4). In each of these cases the main effect of the BMR indicator remains significantly positive with the same order of magnitude as estimated previously, while

[17] This includes cases where there has been more than one switch for a given country (Greece, Italy, Portugal, Spain). In these cases the backward and forward counts start again from each reversal.

the positive post-democracy interaction term indicates a significant but modest cumulative effect.

[Insert Table 8 about here]

Columns (5) and (6) of Table 8 report the coefficients using linearly detrended height as the dependent variable, with and without the time trend and its interaction. Column (6) gives the same coefficient with detrended heights as column (4), which also includes country and year fixed effects. Visual support for this finding is provided in Figure 3, which shows the trend in heights within a window that spans up to 30 years before and after the advent of democracy. In Figure 3A, where the dependent variable is not detrended, there is a modest acceleration in height after the switch to democracy, but this effect is much more sharply identified in Figure 3B where height is linearly detrended. The results using deviations from quadratic and cubic trends are compared and illustrated in Appendix II, section I.

[Insert Figures 3A and 3B about here]

*5.5 Further Robustness Checks*

In a separate appendix (Appendix II) we submit our model to a battery of further tests. These include using a dummy variable version of our instrument (colonies vs no colonies), using different thresholds for the democracy dummy and using versions of the democracy variable derived from alternative sources. These tests all support the finding of a positive and significant effect of democracy on height in both 2WFE and IV estimates. We also explore adding trends, adding separate dummies for war periods, and adjusting the timing of exposure. In addition, we show that dropping observations country-by-country and period-by-period has only modest effects on the democracy coefficient; also, dropping all non-coloniser countries has little effect

in the IV analysis. Finally, we show that, democratic reversals have the expected effect and that the effect of democracy is robust even in the presence of variables related to other social movements.

# 6 Mechanisms

Next, we explore several alternative mechanisms that can explain the effect of democratisation on stature. More specifically, we examine the following mechanisms:

i. The development of universal health coverage measured as a discrete variable (UCOV); this represents increased access to professional health care for both mother and child. In addition, the universal health converage helped to complete the 'epidemiological transition' from a world in which childhood deaths and infectious diseases were common to one in which childhood deaths were rare (Costa, 2015).

ii. The reduction of inequality, measured by the Gini coefficient of income (GINI); this reflects the sensitivity of heights to changes in inequality as discussed in Komlos, and Kriwy (2003).

iii. The expansion of urbanisation, specifically the percentage of population in urban areas in excess of 100,000, beginning of period (URB100); this captures better access to health care in urban areas during the period examined.

iv. The expansion of the railway network measured in miles per 1000 population (RWAY); this reduces the transport costs and expands access to new health technologies (Solakoglu, E.G., 2007).

v. Finally, we examine the number of years of war in each five-year period, divided by five (WAR). Previous studies have found that conflict reduces heights (Akresh et al., 2012), and democracy reduces the probability of conflict and war.

These variables allow us to explore potential links between political systems and health outcomes, and the heterogeneous effect between just being democratic and being an "established" democracy. We employ a series of two-step estimation procedures, the first estimating the mechanism explained by the democratic variable, and the second estimating the

association between the estimated mechanism and heights. The identification is described in Appendix I, Table AI.5 in detail. In Table 9 we report only the estimates using BCFH_A5 and BMR_F_A5 and only for the IV approach (the impact of the instrumented democratic treatment on the mechanism variable). Panel A of Table 9 excludes the three controls while Panel B includes controls but does not report their coefficients.

[Insert Table 9 about here]

Table 9 reports estimates for the five possible mechanisms identified above (UCOV, GINI, URB100, RWAY, and WAR) on the two selected democratic treatments (BCFH_A5 and BMR_F_A5). In the upper panel (A) we first observe that both democratic treatments have a positive, significant, and sizable effect on the probability of transitioning towards a universal healthcare system coverage (UCOV, columns 1 and 2); second a negative impact on the Gini index (GINI, columns 3 and 4), meaning a reduction in income inequality. Precision strengthens when using BCFH (5%) rather than BMR_F (10%), but overall it produces comparably sized coefficients. In contrast, the coefficients on the urbanisation index (URB100, columns 5 and 6) are insignificant but the impact on railway infrastructure (RWAY, columns 7 and 8) is positive, quite significant and sizable (0.7 to 1.1 for miles per 1000 population). There is also a robust negative correlation between the democratic dummies and the average years spent in war (WAR, columns 9 and 10). As for the impact, we find a reduction of 0.25 percentage points, which can also be interpreted as a reduction of about 5% for the time spent in war for democracies compared with non-democracies.

Panel B of Table 9 reports the second stage effect of the instrumented mechanism on height. There are strong positive coefficients on universal health coverage and negative coefficients on the Gini index. This suggests that widening health coverage and reducing

inequality were relevant channels through which democracy improved physical well-being. As shown in columns (5) to (8) both urbanisation and railway infrastructure have significant effects on height although only the latter is influenced by democracy. Columns (9) and (10) show significant coefficients for the effect of war on height. We should note, however, that these mechanisms are correlated, as each depends to some degree on democracy. As a result the effect of democracy working through these different channels will sum to more than their reduced form effect in Table 4. Results omitting the first stage (treating democracy as exogenous) are presented in Appendix II Table AI.6. These produce results that are broadly consistent with those in Table 9.

# 7 Heterogeneity

It is possible that the effects of democracy are heterogeneous to different locations, times, and specific events. In this section we explore possible heterogeneity in three different dimensions: across countries, over time, and between different aspects of democracy.

### *7.1 Spatial Heterogeneity*

Democratisation may have stronger or weaker effects on height in different countries. These differential effects could be associated with degrees of political centralisation, pre-existing power relations, and the ability of elites to resist the social consequences of democratic rule. To examine such differences, we divide our 15 countries into three regional groups North, Central and South, for which trends in average height were illustrated in Figure 1. While average heights in the Centre countries converged on those in the North during the 20$^{th}$ century, male populations were much shorter in the South, but their heights advanced more rapidly after 1950.

We explore possible heterogeneity in the effect of democracy by introducing, in turn, a dummy for one of the three regions interacted with one of three measures of democracy. Table

10 presents 2WFE results without controls in panel A, and with the three controls in panel B. The two measures of democracy correspond with those in columns (2) and (4) of the baseline estimates in Table 1 (2WFE) and Table 4 (IV) although the number of observations differs. The coefficients on the interaction terms in panel A vary in sign, but they are uniformly insignificant, while the main effects remain significant in every case. A very similar pattern is observed in panel B although there is a marginally significant negative coefficient in column (11) for the interaction with southern Europe when using the BCFH measure of democracy. Estimates of the same equations using IV, reported in Appendix III Table IIIA.1, produce a similar picture but with larger and more significant interaction effects. Overall, the results are not driven by one European region, and they support the positive effect of democracy on height in each of the three regional groups.

**[Insert Table 10 about here]**

*7.2 Period Heterogeneity*

The link between democracy and health is likely to have varied across broad historical eras both because health technology advanced and because democracy itself evolved. In his widely cited analysis Huntington (1991, 1993) identified three different waves of democratisation, each with different characteristics. Our period covers the first two waves identified by Huntington: the first up to the 1920s and the second in the 1940s and 1950s, with some reversal in between. We use the BMR index to identify the periods corresponding to each of these waves as explained in Appendix III.B, and we create a dummy variable for the years in each wave.[18] We then construct interactions between these dummies and our dichotomous

[18] We use the BMR index because it matches the methodology used by Huntington (1991, 1993). But the Huntington method of classification is quite sensitive to the definition of democracy and so the precise timing of these waves is

indexes of democracy, first demeaning both variables (as suggested by Balli and Sørensen, 2013) in order to preserve the main effect in the regression.

The results of this analysis are presented in Table 11, where the three controls are omitted in columns (1), (3) and (5) and included in columns (2), (4) and (6). The interaction terms are insignificant for all three measures of democracy, suggesting that neither the first nor the second wave involved significant deviations from the main democratic effect. While the coefficient on the main effect remains positive, it becomes less significant particularly for the BMR index.

[Insert Table 11 about here]

Although the two waves of democracy do not produce significantly different impacts on heights, they involved advances along different democratic dimensions with different social consequences. The first wave involved broader participation and deeper engagement of civil society in the polity, with a focus on alleviating extreme poverty and combating infectious diseases. The second stage involved greater responsiveness of the government to higher-level needs of its citizens leading to the development of the welfare state and especially the expansion of health coverage. These issues are examined in further detail in Appendix III.D.

*7.3 Event-Type Heterogeneity*

Democracy has many facets that emerge in different phases of democratic development. Here we explore some of these dimensions using a different measure of democracy, version 9 of V-Dem, which is explained in more detail in Appendix III. The five main components are (1)

disputed. For example, Doorenspleet (2000) produced a revised version dating the first wave from1893 to 1924 and the second wave from 1944 to 1957.

Electoral: free and fair elections, (2) Liberal: constraints on the exercise of executive power, (3) Participatory: engagement of civil society beyond the full franchise, (4) Deliberative: decisions based on reasoned dialogue, and (5) Egalitarian: equal treatment across social groups. Each of these components is an index scaled from zero (complete absence) to one (full extent). The electoral liberal and participatory indices are closest to the ingredients of our other measures of democracy. Full definitions are provided in Appendix III.C.

In Table 12 we use each of these alternative features in turn as the democracy variable in the 2WFE model without controls (panel A) and with controls (panel B). In order to account for the changing importance of these features over time (and across waves), we also include interactions with a dummy variable for post-1945, so that if one becomes more (less) important the interaction coefficients would be significantly positive (negative).

[Insert Table 12 about here]

The main effects of the electoral, liberal and participatory features of democracy are all positive and significant, consistent with our baseline results. These coefficients are generally larger than those for other measures of democracy, both due to differences in scaling and its continuous measurement. Consistent with our earlier findings, the participatory dimension of democracy delivers the largest coefficient. But none of the post-war interactions is remotely significant, which supports the idea that, while these democratic components advanced at different times, their impact was similar before and 1945. In contrast, both the main effect of the deliberative aspect of democracy and the interaction become insignificant in column (8). All the coefficients on the egalitarian element of democracy fail to achieve significance, which is surprising in light of the result on inequality as a mechanism in Table 9. But the lower precision may be due to the reduction in the number of observations for these aspects of democracy,

especially in the earlier decades. However, IV results reported in Appendix Tables IIIC.3 to IIIC.5 produce somewhat stronger results. We conclude that each of these features of democracy contributed something to improving childhood health, although the deliberative and egalitarian aspects are less clear.

# 8 Conclusion

Relying on unique historical data on human stature in Western Europe over more than a century, we study the causal effect of the adoption of measures of democratic progress, and especially the extension of the franchise to women, on human stature. We exploit a time-varying instrument that results from the process of decolonisation in many European countries in order to identify the effect of democratic progress on adult heights above and beyond country and year fixed effects.

Against the backdrop that democratic institutions can be captured by small elites, and are not always sensitive to minorities (Krueger et al., 2015; Powell-Jackson et al., 2011), our estimates are suggestive of a net return of democratic progress in improving average well-being. We find that the transition from autocracy to democracy increases the average adult height from about 0.7 cm, which is 6.4% of the increase over the period of 120 years (from 1860 to 1980). Furthermore, accounting for female voting rights increases the effect on height to about 1.7 cm (11% of the total increase). Our interpretation is that these results show that democracies enhance the conditions that underlie physical well-being during childhood. Our results survive placebo tests as well as robustness checks such as different specifications, the inclusion of controls, and a number of other tests.

Although our results refer to Europe since the mid-nineteenth century, and the results might not generalise to other world regions or other historical eras, they speak into the broader literature on the effect of democracy on health (Besley and Kudamatsu, 2006), as well as . the effect of increasing female representation (Chattopadhyay and Duflo, 2004; Bhalotra and Clots-Figueras, 2014) on wellbeing. Examining the channels of influence, we find that democratic institutions are more likely to prioritise reforms that improve health and well-being such as the expansion of health care coverage. We have identified other potential second order effects such as advances in infrastructure development, reductions in income and wealth inequality as well

as reduced risk of conflict through exposure to wars. Our results are consistent with an overall picture of welfare improvements of democracy and the extension of the female franchise in Europe.

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# Tables and Figures

## Table 1. Baseline Regressions (2WFE) of Height on Democracy

| Panel A | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Treat is | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| Democracy | 0.726*** | 0.794*** | 1.151*** | 0.984*** |
| | (0.073) | (0.080) | (0.116) | (0.099) |
| Observations | 256 | 256 | 256 | 256 |
| R-squared | 0.974 | 0.975 | 0.976 | 0.975 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year dummies | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × |

| Panel B | (5) | (6) | (7) | (8) |
|---|---|---|---|---|
| Treat is: | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| Democracy | 0.623*** | 0.698*** | 0.936*** | 0.788*** |
| | (0.063) | (0.071) | (0.096) | (0.081) |
| PC_GDP (log) | 0.448 | 0.420 | 0.396 | 0.353 |
| | (0.058) | (0.055) | (0.052) | (0.046) |
| IMO | -0.091*** | -0.092*** | -0.092*** | -0.094*** |
| | (-0.135) | (-0.137) | (-0.136) | (-0.139) |
| PARENT_EDUC | 0.135 | 0.129 | 0.067 | 0.084 |
| | (0.053) | (0.051) | (0.026) | (0.033) |
| Observations | 247 | 247 | 247 | 247 |
| R-squared | 0.976 | 0.976 | 0.977 | 0.976 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year dummies | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is five-year averages of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I AI3. In panel B we include controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** $p<0.01$, ** $p<0.05$, * $p<0.1$). All regressions contain both country and year dummies.

## Table 2. Reduced Form Estimates (including leads of the IV)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| Sample of reference | | BCFH | | | BCFH_A5 | | | BMR_F | |
| IV-AREA_COLONY_A10 | -0.404*** | -0.124*** | -0.144** | -0.414*** | -0.129*** | -0.150** | -0.379*** | -0.129*** | -0.162*** |
| | (0.036) | (0.020) | (0.062) | (0.037) | (0.021) | (0.061) | (0.034) | (0.019) | (0.058) |
| IV(1 lead) | | | 0.076 | | | 0.096 | | | 0.100 |
| | | | (0.109) | | | (0.108) | | | (0.104) |
| IV(2 leads) | | | -0.083 | | | -0.101 | | | -0.092 |
| | | | (0.074) | | | (0.075) | | | (0.071) |
| PC_GDP(log) | | 2.988*** | 3.402*** | | 2.987*** | 3.368*** | | 2.834*** | 3.257*** |
| | | (0.377) | (0.410) | | (0.376) | (0.410) | | (0.333) | (0.359) |
| IMO | | -0.177*** | -0.152*** | | -0.174*** | -0.148*** | | -0.180*** | -0.158*** |
| | | (0.032) | (0.032) | | (0.031) | (0.031) | | (0.032) | (0.032) |
| PARENT_EDUC | | 0.675*** | 0.718*** | | 0.676*** | 0.717*** | | 0.723*** | 0.752*** |
| | | (0.098) | (0.100) | | (0.100) | (0.101) | | (0.092) | (0.093) |
| Obs. | 271 | 263 | 235 | 255 | 247 | 221 | 300 | 291 | 261 |
| R-squared | 0.302 | 0.871 | 0.871 | 0.308 | 0.875 | 0.875 | 0.278 | 0.872 | 0.873 |
| Controls | × | ✓ | ✓ | × | ✓ | ✓ | × | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Dummies | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Columns (1), (4) and (7) omit the three controls used in Panel B of Table 1; these are included in the other regressions. Instrument (IV) is the log of the moving average (*t*-9, *t*) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), originally expressed in km$^2$. Colonial relationships in dyadic form are taken from WM06. The reference to the different democracy variables of interest in the column headings refers only to the sample, which is that for the non-missing observations for the three democracy variables, BCFH, BCFH_A5, BMR_F, and which is therefore used to estimate the reduced forms. The democratic variables are *omitted* from the reduced form regression. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

## Table 3. Instrumental Variable Independence Tests

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| PC_GDP (log) | -2.468 | | | -2.829* | 0.557 | 0.277 | 0.522 |
| | (1.627) | | | (1.634) | (0.882) | (0.796) | (0.824) |
| IMO | | 0.095 | | 0.122 | 0.011 | 0.037 | 0.050 |
| | | (0.098) | | (0.096) | (0.039) | (0.038) | (0.045) |
| PARENT_EDUC | | | -0.199 | -0.148 | -0.271* | -0.113 | -0.148 |
| | | | (0.294) | (0.286) | (0.147) | (0.121) | (0.124) |
| *Lags of* AREA_COLONY_A10 | | | | | | | |
| Lag 1 | | | | | 0.912*** | 1.426*** | 1.526*** |
| | | | | | (0.030) | (0.125) | (0.130) |
| Lag 2 | | | | | | -0.556*** | -0.809*** |
| | | | | | | (0.126) | (0.189) |
| Lag 3 | | | | | | | 0.169* |
| | | | | | | | (0.092) |
| Observations | 247 | 247 | 247 | 247 | 242 | 231 | 220 |
| R-squared | 0.813 | 0.812 | 0.811 | 0.815 | 0.974 | 0.980 | 0.981 |
| Year dummies | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable in all regressions from (1) to (7) is the IV in Table 2, which is the log of the (t-9, t) average of total area colonised by country *i* in year *t*, originally expressed in km$^2$ (AREA_COLONY_A10). Colonial relationships in dyadic form are taken from WM06. In this table we also control, progressively, for the 1$^{st}$, 2$^{nd}$, and 3$^{rd}$ lagged values of the instrument. Other controls are drawn from Hatton (2014, H14), see Appendix I, Table AI1 for details on definitions and original sources. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

## Table 4. Instrumental Variables: 2nd Stage Results

| Panel A | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Treat is: | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| Democracy | 1.035*** | 1.102*** | 1.649*** | 1.688*** |
| | (0.337) | (0.355) | (0.552) | (0.567) |
| Observations | 255 | 255 | 255 | 255 |
| R-squared | 0.974 | 0.974 | 0.975 | 0.974 |
| Year dummies | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × |
| Min.Eig. | 63.34 | 55.20 | 28.96 | 26.18 |
| F-stat | 72.25 | 65.69 | 31.75 | 29.25 |
| 1st stage coef. | -0.044*** | -0.041*** | -0.028*** | -0.027*** |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| Durbin p-val | 0.368 | 0.404 | 0.383 | 0.239 |
| Hausman-Wu p-val | 0.410 | 0.445 | 0.425 | 0.281 |
| Panel B | (5) | (6) | (7) | (8) |
| Treat is: | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| Democracy. | 0.967*** | 1.035*** | 1.577*** | 1.640*** |
| | (0.355) | (0.378) | (0.583) | (0.611) |
| PC_GDP (log) | 0.381 | 0.348 | 0.278 | 0.119 |
| | (0.440) | (0.459) | (0.426) | (0.485) |
| IMO | -0.087*** | -0.089*** | -0.087*** | -0.090*** |
| | (0.027) | (0.026) | (0.026) | (0.026) |
| PARENT_EDUC | 0.137 | 0.129 | 0.024 | 0.033 |
| | (0.087) | (0.085) | (0.097) | (0.096) |
| Observations | 247 | 247 | 247 | 247 |
| R-squared | 0.976 | 0.976 | 0.976 | 0.975 |
| Year dummies | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Min Eig. | 58.49 | 50.32 | 26.75 | 23.29 |
| F-stat | 65.30 | 57.65 | 28.62 | 25.62 |
| 1st stage coef. | -0.043*** | -0.041*** | -0.027*** | -0.026*** |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| Durbin p-val | 0.314 | 0.362 | 0.273 | 0.169 |
| Hausman-Wu p-val | 0.360 | 0.408 | 0.319 | 0.211 |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I, AI3. Controls are drawn from Hatton (2014, H14), see Table AI1. Instrument (IV) is the log of the moving average (t-9, t) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), and originally expressed in km$^2$. Colonial relationships in dyadic form are taken from WM06. In all regressions we report the 1st stage F-statistic, the minimum eigenvalue, and the 1st stage coefficient. For full 1st stage results, see Appendix I Table AI4. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies. The $H_0$ for Durbin and Hausman-Wu tests is that the variable is exogenous. The P-values do not reject $H_0$.

## Table 5. Test of 2-Stage Residual Inclusion

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Treatment is: | BCFH_A5 | BMR_F | BCFH_A5 | BMR_F_A5 |
| Democracy. | 1.102*** | 2.201*** | 1.035** | 1.707** |
| | (0.410) | (0.685) | (0.426) | (0.712) |
| 1st Stage Est. Residual | -0.391 | -1.402* | -0.419 | -1.048 |
| | (0.466) | (0.751) | (0.487) | (0.785) |
| Observations | 255 | 300 | 247 | 291 |
| R-squared | 0.974 | 0.969 | 0.976 | 0.972 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator including the stricter condition for being a democracy that at least half of the adult female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I, AI3. Controls are drawn from Hatton (2014, H14), see Appendix I, Table AI1. The instrument (IV) is the log of the moving average (*t*-9, *t*) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), and originally expressed in km$^2$. Colonial relationships in dyadic form are taken from WM06. Estimated first-stage residuals are included in the second-stage regression. The procedure is two stages; the coefficients reported are from the second stage. We report (a) the estimated coefficient, (b) the robust bootstrapped errors in parentheses (500 repetitions) below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

## Table 6. Falsification Test: 2WFE

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Treatment is: | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| Democracy. | 0.477** | 0.655*** | 0.852*** | 0.737*** |
| | (0.215) | (0.238) | (0.223) | (0.214) |
| TreatF(4 leads) | 0.187 | 0.480** | 0.271 | 0.362* |
| | (0.242) | (0.232) | (0.201) | (0.202) |
| Observations | 250 | 222 | 291 | 291 |
| R-squared | 0.973 | 0.978 | 0.972 | 0.972 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year dummies | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator imposing stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I, AI3. TreatF is the 4-period lead (20 years forward) of the democracy variable. Controls are drawn from Hatton (2014, H14), see Appendix I, Table AI1. We report (a) the estimated coefficient, (b) the robust bootstrapped errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

## Table 7. Placebo Tests with Random Assignment of Treatment

| Window around actual treatment in years | (-10, -5; +5; +10) | | | (-15, -10, -5; +5; +10; +15) | | | (-15, -10, -5; +5; +10; +15) | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment is: | BCFH_A5 | BMR | Polity_D | BCFH_A5 | BMR | Polity_D | BCFH_A5 | BMR | Polity_D |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Democracy (Placebo) | 0.146 | 0.282 | 0.060 | -0.052 | 0.104 | -0.160 | 0.047 | 0.150 | -0.209 |
| | (0.732) | (1.453) | (0.388) | (-0.246) | (0.510) | (-0.820) | (0.205) | (0.730) | (-0.958) |
| Observations | 264 | 283 | 272 | 263 | 282 | 272 | 251 | 282 | 260 |
| R-squared | 0.972 | 0.971 | 0.972 | 0.971 | 0.971 | 0.971 | 0.971 | 0.971 | 0.971 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are the democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH) and the dummies separately from BMR13 and Polity4. For more details on the construction of these variables, see Appendix I, Table AI3. Controls are drawn from Hatton (2014, H14), see Appendix 1, Table A1. The placebo test is based on the random assignment of years around the time of democratisation as noted in each heading. We report (a) the estimated coefficient, (b) the robust bootstrapped errors based on 1,000 replications in parentheses below (*** $p<0.01$, ** $p<0.05$, * $p<0.1$). All regressions contain both country and year dummies.

## Table 8. Event Study: Trends Before and After Democratisation

| | Heights | | | | Linearly Detrended Heights | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Democracy: BMR | 1.056*** | 0.466** | 1.002*** | 0.464** | 0.485*** | 0.464** |
| | (0.334) | (0.234) | (0.323) | (0.221) | (0.185) | (0.221) |
| Time | -0.329*** | -0.133*** | -0.420*** | -0.0716* | | -0.0716* |
| | (0.0484) | (0.0338) | (0.0538) | (0.0400) | | (0.0400) |
| Time × BMR | 0.373*** | 0.213*** | 0.471*** | 0.119*** | | 0.119*** |
| | (0.0481) | (0.0314) | (0.0548) | (0.0405) | | (0.0405) |
| GDP_PC (Log) | 2.459*** | 2.471*** | 3.672*** | 1.224** | 0.878* | 1.224** |
| | (0.340) | (0.261) | (0.386) | (0.484) | (0.470) | (0.484) |
| PARENT_EDUC | 0.744*** | 0.237** | 0.647*** | 0.182** | 0.192** | 0.182** |
| | (0.0974) | (0.0996) | (0.110) | (0.0908) | (0.0906) | (0.0908) |
| IMO | -0.329*** | -0.344*** | -0.420*** | -0.177*** | -0.105*** | -0.177*** |
| | (0.0284) | (0.0239) | (0.0495) | (0.0344) | (0.0271) | (0.0344) |
| Observations | 284 | 284 | 284 | 284 | 284 | 284 |
| R-squared | 0.876 | 0.964 | 0.891 | 0.973 | 0.948 | 0.950 |
| Country FE | × | ✓ | × | ✓ | ✓ | ✓ |
| Year FE | × | × | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. The treatment variable is the democratic dummy from BMR13. Controls are drawn from Hatton (2014, H14), see Appendix I, Table A1. The Time variable is a "counter" variable defined as the number of five-year periods before (negative) and after (positive) the switch to democracy. If there is a reversal, then the count begins again from the next switch to democracy. We report(a) the estimated coefficients, and (b) the robust bootstrapped errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

## Table 9. Mechanisms: IV Regressions

| (A) Mechanisms | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | UCOV | UCOV | GINI | GINI | URB100 | URB100 | RWAY | RWAY | WAR | WAR |
| Estimated Mechanism on Height | 1.499*** | 1.317*** | -0.361*** | -0.329*** | 1.308*** | 0.177*** | 1.015*** | 0.659*** | -2.358*** | -2.863*** |
| | (0.477) | (0.412) | (0.120) | (0.101) | (0.395) | (0.047) | (0.327) | (0.210) | (0.873) | (0.851) |
| R-squared | 0.976 | 0.972 | 0.976 | 0.972 | 0.977 | 0.972 | 0.976 | 0.972 | 0.977 | 0.973 |
| (B) 2SLS 2nd stage | | | | | | | | | | |
| Democracy measure | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 |
| Democracy on Mechanism | 0.466*** | 0.557** | -1.935*** | -2.230** | 0.557 | 4.429 | 0.688*** | 1.125*** | -0.274*** | -0.294** |
| | (0.150) | (0.225) | (0.745) | (1.086) | (1.855) | (3.286) | (0.152) | (0.336) | (0.093) | (0.136) |
| R-squared | 0.672 | 0.683 | 0.968 | 0.965 | 0.905 | 0.868 | 0.696 | 0.555 | 0.422 | 0.607 |
| Min Eigenvalue | 50.32 | 19.25 | 50.32 | 19.25 | 54.93 | 20.90 | 50.32 | 17.52 | 49.40 | 24.94 |
| F-stat | 57.65 | 19.96 | 57.65 | 19.96 | 62.83 | 20.56 | 57.65 | 18.03 | 58.40 | 22.84 |
| Stock Yogo 10% Threshold | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin pval | 0.001 | 0.209 | 0.633 | 0.303 | 0.338 | 0.010 | 0.000 | 0.000 | 0.000 | 0.175 |
| Hausman-Wu pval | 0.002 | 0.245 | 0.665 | 0.342 | 0.385 | 0.017 | 0.000 | 0.000 | 0.001 | 0.213 |
| (C) 1st stage results | | | | | | | | | | |
| AREA_COLONY_A10 (instrument) | -0.041*** | -0.022*** | -0.041*** | -0.022*** | -0.042*** | -0.024*** | -0.041*** | -0.021*** | -0.045*** | -0.027*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.006) | (0.006) |
| Observations | 247 | 291 | 247 | 291 | 243 | 280 | 247 | 290 | 229 | 273 |
| R-squared | 0.776 | 0.764 | 0.776 | 0.764 | 0.783 | 0.774 | 0.776 | 0.767 | 0.774 | 0.766 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F_A5). For more details on the construction of these variables, see Appendix I, Table AI3. Controls are drawn from Hatton (2014, H14), see Appendix I Table A1. The instrument (IV) is the log of the moving average (*t*-9, *t*) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), and originally expressed in km$^2$. Colonial relationships in dyadic form are taken from WM06. Mechanisms chosen are variables taken from H14. UCOV: Dummy for universal health coverage; GINI: Gini coefficient for income; URB100: Percent of population in urban areas > 100,000, beginning of period; RWAY: Railway miles per 1,000 population; WAR: Number of years of war in the last five years and divided by 5. In all regressions we report the 1st stage F-statistic, the minimum eigenvalue, and the 1st stage coefficient in Panel C. We report (a) the estimated coefficient, and (b) robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1.). Standard errors are bootstrapped with 500 repetitions. All regressions contain country and year dummies and the usual set of controls. See Appendix I AI5 for more detail on the method used for these regressions. The results when omitting the first of the three stages (thus treating democracy as exogenous) are reported in Appendix I, Table AI5.

## Table 10. Testing for Heterogeneous Effects of Democracy by European Region (2WFE)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BCFH_A5 | | | | | | BMR_F_A5 | | | | | |
| Democracy | 0.993*** | 0.930*** | 0.639*** | 0.649** | 0.814*** | 0.564** | 0.873*** | 0.787*** | 0.888*** | 0.821*** | 0.936*** | 0.589** |
| | (0.243) | (0.222) | (0.244) | (0.257) | (0.249) | (0.232) | (0.220) | (0.209) | (0.248) | (0.274) | (0.270) | (0.252) |
| Demo x Southern Europe | -0.554 | -0.640* | | | | | 0.105 | -0.231 | | | | |
| | (0.348) | (0.338) | | | | | (0.373) | (0.350) | | | | |
| Demo x Central Europe | | | 0.409 | 0.129 | | | | | 0.030 | -0.201 | | |
| | | | (0.264) | (0.325) | | | | | (0.240) | (0.300) | | |
| Demo x Northern Europe | | | | | -0.075 | 0.529 | | | | | -0.096 | 0.435 |
| | | | | | (0.268) | (0.326) | | | | | (0.255) | (0.327) |
| Observations | 256 | 247 | 256 | 247 | 256 | 247 | 301 | 291 | 301 | 291 | 301 | 291 |
| R-squared | 0.975 | 0.977 | 0.975 | 0.976 | 0.975 | 0.977 | 0.969 | 0.972 | 0.969 | 0.972 | 0.969 | 0.972 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | ✓ | × | ✓ | × | ✓ | × | ✓ | × | ✓ | × | ✓ |

*Notes:* Here we use BCFH_A5 and BMF_F_A5 to be compared with columns 2 and 4 of Table 1 and Table 4. Grouping in regions follow the graphical breakdown used in Figure 1 showing the trends by European Macroregion. Control group is the usual set of controls (PARENT_EDUC, PC_GDP, and IMO). European regions: Northern (Finland, Denmark, Norway, Great Britain, Ireland, and Sweden), Central (Austria, Belgium, Germany, France, and Netherlands), and Southern (Greece, Spain, Italy, and Portugal) Europe. Data source is [H14].

## Table 11. Testing Interactions of Democracy with 'Huntington Waves'

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Democracy is: | BCFH_A5 | BCFH_A5 | BMR_A5 | BMR_A5 | POLITY_A5 | POLITY_A5 |
| Democratic Treatment | 0.819*** | 0.699** | 0.467* | 0.442* | 0.632** | 0.563** |
| | (0.304) | (0.287) | (0.273) | (0.248) | (0.278) | (0.258) |
| Democracy × HWave1 (both variables within demeaned) | -0.0167 | 0.161 | 0.0722 | 0.147 | -0.124 | -0.0891 |
| | (0.582) | (0.550) | (0.512) | (0.469) | (0.576) | (0.532) |
| Democracy × HWave2 (both variables within demeaned) | -0.131 | -0.196 | 0.557 | 0.341 | 0.183 | 0.0729 |
| | (0.585) | (0.557) | (0.581) | (0.533) | (0.580) | (0.558) |
| Observations | 256 | 247 | 293 | 283 | 264 | 255 |
| R-squared | 0.975 | 0.976 | 0.968 | 0.971 | 0.974 | 0.976 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | ✓ | × | ✓ | × | ✓ |
| Joint Estimate: Demo + Demo x W1 | 0.803 | 0.860 | 0.539 | 0.589 | 0.509 | 0.474 |
| *Standard Error HW1* | 0.430 | 0.411 | 0.381 | 0.361 | 0.402 | 0.406 |
| *t -statistic HW1* | 1.867 | 2.095 | 1.413 | 1.630 | 1.266 | 1.167 |
| Joint Estimate: Demo + Demo x W2 | 0.688 | 0.504 | 1.023 | 0.783 | 0.815 | 0.636 |
| *Standard Error HW2* | 0.522 | 0.490 | 0.500 | 0.463 | 0.502 | 0.492 |
| *t -statistic HW2* | 1.318 | 1.027 | 2.046 | 1.692 | 1.622 | 1.292 |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are the democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH) and the dummies separately from BMR13 and Polity4. For more details on the construction of these variables, see Appendix I, AI3. Controls are drawn from Hatton (2014, H14), see Appendix I, Table AI1. The placebo test is based on the random assignment of years around the time of democratisation as noted in each heading. We report (a) the estimated coefficient, (b) the robust bootstrapped errors based on 999 replications in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

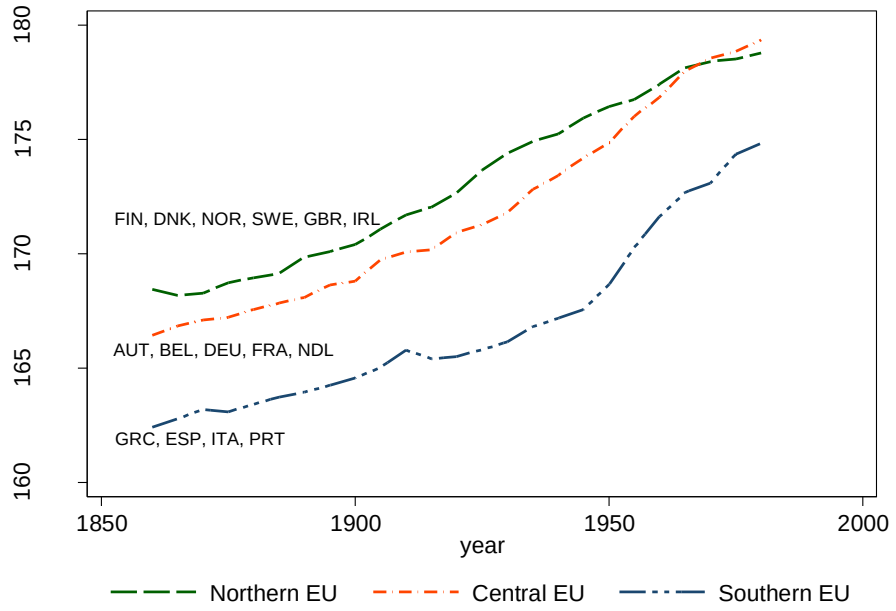
## Table 12. 2WFE Results using V-Dem Components with Interactions for Post-WWII

| V-Dem Index | ELECTORAL | | LIBERAL | | PARTICIPATORY | | DELIBERATIVE | | EGALITARIAN | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Democracy | 1.583*** | 1.740*** | 1.765*** | 1.885*** | 2.192*** | 2.518*** | 1.500** | 1.434* | 1.217 | 1.031 |
| | (2.910) | (3.081) | (2.902) | (2.952) | (2.865) | (3.101) | (2.036) | (1.846) | (1.463) | (1.136) |
| Democracy x Post1945 | | 0.666 | | 0.440 | | 1.375 | | -0.229 | | -0.626 |
| | | (0.716) | | (0.432) | | (1.036) | | (-0.160) | | (-0.362) |
| Observations | 249 | 249 | 247 | 247 | 249 | 249 | 181 | 181 | 181 | 181 |
| R-squared | 0.974 | 0.974 | 0.974 | 0.974 | 0.974 | 0.975 | 0.972 | 0.972 | 0.972 | 0.972 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | × | × | × | × | × | × |
| | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) | (19) | (20) |
| Democracy | 1.377** | 1.470*** | 1.613** | 1.623** | 2.098** | 2.199*** | 1.565** | 1.278 | 1.254 | 0.781 |
| | (2.472) | (2.623) | (2.592) | (2.596) | (2.580) | (2.660) | (2.119) | (1.601) | (1.468) | (0.804) |
| Democracy x Post1945 | | 0.436 | | 0.039 | | 0.469 | | -1.083 | | -1.697 |
| | | (0.473) | | (0.040) | | (0.357) | | (-0.720) | | (-0.931) |
| Observations | 240 | 240 | 238 | 238 | 240 | 240 | 180 | 180 | 180 | 180 |
| R-squared | 0.976 | 0.976 | 0.975 | 0.975 | 0.976 | 0.976 | 0.974 | 0.974 | 0.973 | 0.974 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes*: The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are the democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH) and the dummies separately from BMR13 and Polity4. For more details on the construction of these variables, see Appendix I, AI3. Controls are drawn from Hatton (2014, H14), see Appendix I, Table AI1. Regressions are using the five high-level indexes from the V-Dem dataset. For definitions and descriptive statistics of the indexes, please see Appendix III, section IIIC.1and Table IIIC.2. IV results are reported in Table IIIC.3 and IIIC.4.

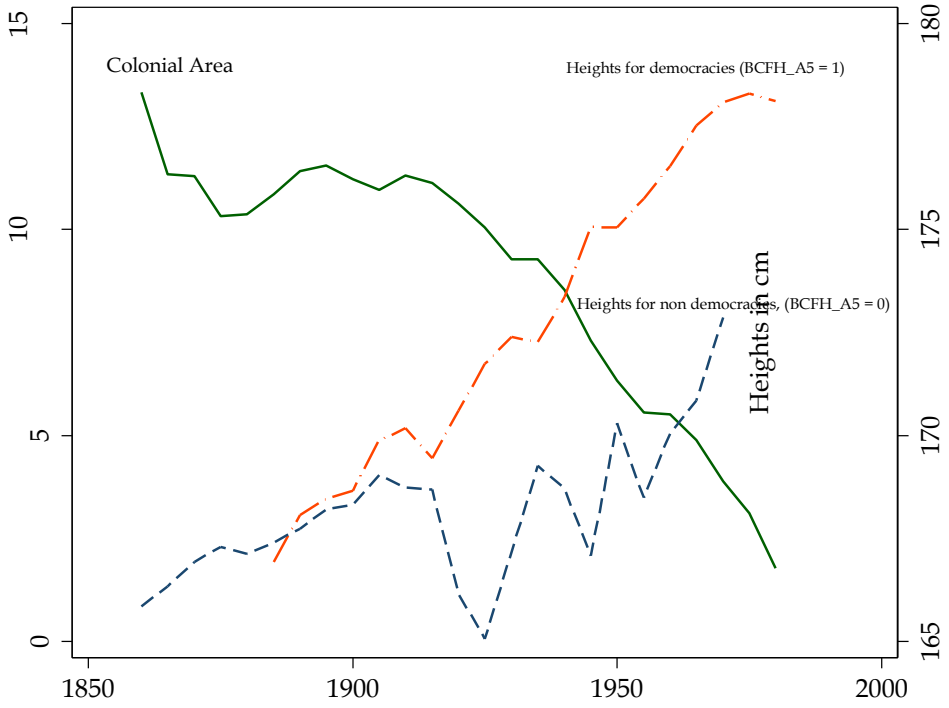
# Figures

## Figure 1. Heights Trends by European Regions (South, Centre, and North)




*Notes*: Average heights in cm 1860-1980 for three European regions: Northern (Finland, Denmark, Norway, Great Britain, Ireland, and Sweden), Central (Austria, Belgium, Germany, France, and Netherlands), and Southern (Greece, Spain, Italy, and Portugal) Europe. Data source is [H14].

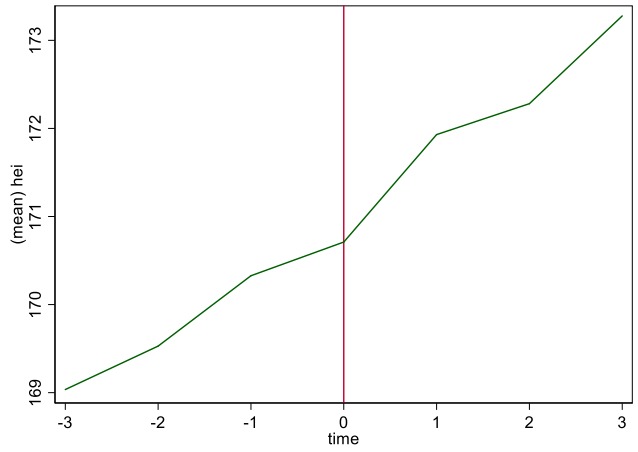
## Figure 2. Colonised Area and Trends in Height by Democratic Status



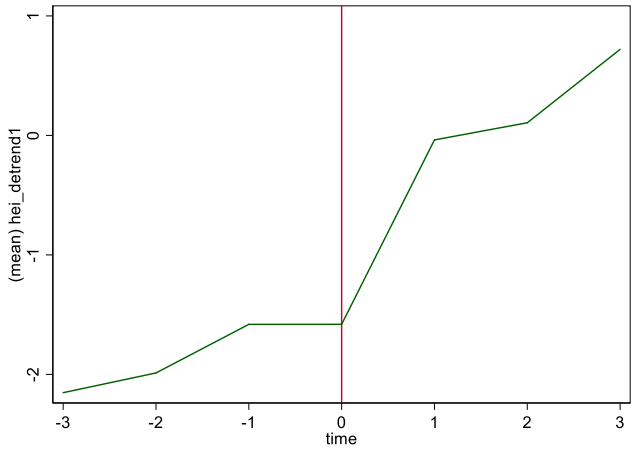

*Notes:* The figure shows both the trend of colonial area (variable COLONIAL_AREA_A10) averaged across countries and the trends of heights for democracies (BCFH_A5 == 1) and non- democracies (BCFH_A5 == 0).

## Figure 3. Change in Heights over a 30-year Window before-after Democratization Events

(A) Heights




(B) Linearly detrended heights




*Notes*: Dummy used is BMR13. Figure 3A uses the original HB10 heights, while figure 3B uses linearly detrended heights obtained by first regressing heights on a linear trend.

# Appendix I
# Variable Definitions, Descriptive Statistics, Methods and Results

**Table AI.1. European Historical Data: Sources and Definitions**

| Variables | Sources and Definitions |
|---|---|
| | **HB10, H14** |
| HEI | The dependent variable is five-year average male height at around age 21 measured in cm. Note: that these are dated at year of birth not year when height was measured. The HB10 sample originally comprises 308 observations of heights from a sample of 15 European countries for the 1860-1980 period. |
| PC_GDP (log) | Log per capita GDP is the log of the 5-year average of real GDP per capita originally from Maddison, see Hatton (2014, H14). |
| IMO | Infant mortality is deaths aged less than one divided by births, expressed in per cent; see H14 for sources. |
| PARENT_EDUC | Parental years of education is an estimate of the number of years of education of the parent's generation i.e. fifteen years before the start of the period (so for 1880-5 it is for the cohort of 1866-70); see H14 for sources and construction. |
| | **Polity4 dataset.** |
| POLITY | Original polity score (polity variable) from the Polity4 dataset. This is a score from -10 (full autocracy) to +10 (full democracy) obtained by adding a series of dummy and categorical variables set as basic components in the Polity dataset. |
| POLITY_D | Polity dummy. Obtained by classifying the dummy equal to 0 if the polity score is negative and equal to 1 for a weakly positive polity score. |
| | **BMR13** |
| BMR | Dummy variable for democracy as defined in BMR13. This according to the joint occurrence of two dimensions/three criteria (*verbatim* from BMR13, p.9):<br>*I. Dimension: Contestation*<br>(1) Criteria: The executive is directly or indirectly elected in popular elections and is responsible either directly to voters or to a legislature.<br>(2) Criteria: The legislature (or the executive if elected directly) is chosen in *free and fair* elections.<br>*II. Dimension: Participation*<br>(3) Criteria: A majority of *adult men* has the right to vote. |
| BMR_A5 | Harmonized (t-4, t) 5-year average version of BMR. (=1 if average ≥ 0.6 in main specifications) For more details, please see section AI3. |
| BMR_F | BMR dummy with the additional restrictive condition that at least half of adult women have the right to vote. |
| BMR_F_A5 | This is BMR_F averaged over the last five years. (=1 if the average is ≥ 0.6) |
| | **Polity4 & BMR13. Our dummy measures for democracy.** |
| BCFH | Dummy obtained by combining the Polity and BMR13 data. |
| BCFH_A5 | Harmonised democracy dummy obtained by combining the Polity and BMR13 data. For more details on BCFH construction and harmonisation of the dummies used throughout, please refer to section AI3. |
| | **MW06** |
| AREA_COLONY_A10 (log of $km^2$) | Colonial area occupied by the country; average for years (t-9 to t), expressed as log of $km^2$ (0 for no colonial territory). The colonial relationships in dyadic form are from MW06. This is the preferred instrument used throughout the main IV regressions. |
| COLONIAL_STATUS | Dummy equal to 1 if the country has any colonial area, 0 otherwise. The colonial relationships in dyadic form are from MW06. Used for robustness checks. |

## Table AI.2. Descriptive Statistics

| Variables | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| HEI | 308 | 171.57 | 4.77 | 162.21 | 182.7 |
| POLITY | 279 | 3.77 | 6.77 | -9.4 | 10 |
| POLITY_D | 279 | 0.66 | 0.47 | 0 | 1 |
| BMR | 294 | 0.6 | 0.49 | 0 | 1 |
| BMR_A5 | 293 | 0.57 | 0.5 | 0 | 1 |
| BMR_F | 301 | 0.41 | 0.49 | 0 | 1 |
| BMR_F_A5 | 301 | 0.4 | 0.49 | 0 | 1 |
| BCFH | 272 | 0.59 | 0.49 | 0 | 1 |
| BCFH_A5 | 256 | 0.57 | 0.5 | 0 | 1 |
| PC_GDP | 300 | 8.22 | 0.64 | 7.07 | 9.61 |
| IMO | 307 | 9.96 | 6.92 | 0.76 | 30.9 |
| PARENT_EDUC | 298 | 6.57 | 1.89 | 2.07 | 10.76 |
| AREA_COLONY_A10 (log of $km^2$) | 307 | 8.4 | 6.71 | 0 | 17.21 |
| AREA_COLONY_A5 (log of $km^2$) | 307 | 8.22 | 6.8 | 0 | 17.21 |
| COLONIAL_STATUS | 307 | 0.59 | 0.49 | 0 | 1 |

*Notes*: Descriptive statistics. For variable definitions, see Table AI1.

## AI.3. Detailed Construction of the BCFH index

The construction of our dichotomous measure of democracy follows a three-step procedure.

1. **Generate polity dummies from polity scores.** The first step reduces the polity index to a dichotomous measure by taking the value 0 for threshold, as in Acemoglu et al. (2019). The raw Polity score is calculated by adding a series of subcategories defining a country as democratic and constrained to be not larger than ten and below 0, and then by subtracting from this first total a series of subcategories defining a country as autocratic and constrained to be between 0 and 10. As a result the range goes from 10 (10 – 0) for a strongly democratic country, to – 10 (0 – 10) for strong autocracies. The dummy thus takes the value 1 when the Polity index is positive or zero, and 0 when negative.

2. **Generate our dummy variable (BCFH) for democratisation.** The second step leads to the construction of the variable BCFH and can be divided in the following three sub-steps 2a- 2c.
   a) We first classify a country as a democracy/non-democracy only when both the dichotomised Polity dummy obtained in step 1 and the BMR index agree;
   b) We do not classify a country when one or both sources do not express a classification;
   c) We classify a country as non-democratic when the two sources do not agree.

3. **Harmonise BCFH by (3a) making a 5-year average and (3b) choosing a threshold value above which the average value is rounded to 1 (above or equal) or 0 (below).** The third and last step harmonises our measure (BCFH) obtained from steps 1 and 2), with the 5-year spans of the heights data. We take the five years (from t-4 to t) moving average values of the BCFH dummy variable obtained in step 2. By construction this variable can take values of 0, 0.2, 0.4, 0.6, 0.8, and 1. We then replace its value with 0 for values below 0.6, and with 1 for values greater than or equal to 0.6.[19] This produces our BCFH_A5_6 variable. It is worth noting that our harmonised variable passes several robustness checks when raising this threshold to 0.8 (BCFH_A5_8) and 1 (BCFH_A5_1).

[19] We take into consideration only cases where there are non-missing values in the last four years. We also use 5-year averaged versions of the variable which divide the sum based on the years available in the case where these are less than 5. Results produced by using these smoothed variables are very similar to the ones reported in the paper. This is mainly because we do not have missing values, apart from the periods involving the World Wars.

## Table AI.4. Full 1st Stage Results for Table 4 Regressions

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| IV | -0.044*** | -0.041*** | -0.028*** | -0.027*** |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| Obs. | 255 | 255 | 255 | 255 |
| R-squared | 0.780 | 0.779 | 0.813 | 0.802 |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| | (5) | (6) | (7) | (8) |
| | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| IV | -0.043*** | -0.041*** | -0.027*** | -0.026*** |
| | -0.005 | -0.005 | -0.005 | -0.005 |
| PC_GDP | 0.072 | 0.099 | 0.11 | 0.202 |
| | -0.116 | -0.132 | -0.108 | -0.124 |
| IMO | -0.006 | -0.004 | -0.004 | -0.002 |
| | -0.007 | -0.007 | -0.007 | -0.007 |
| PARENT_EDUC | -0.013 | -0.004 | 0.064*** | 0.056** |
| Obs. | 247 | 247 | 247 | 247 |
| R-squared | 0.778 | 0.776 | 0.823 | 0.811 |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |

*Notes*: this table shows full 1st stage results of the main IV; 2nd stage results reported in Table 4. Please consult Table AI.1 for variable definitions.

## AI.5. OLS and IV Specification of the 3-step Procedures for Mechanisms

In the OLS (2WFE) estimates we use the following 2-step structure:

$$mech_{it}^{k} = \rho_0 + \rho_1 Demo_{it}^{j} + (\boldsymbol{\rho_2 X'\gamma}) + \pi_i + \tau_t + \varepsilon_{it} \quad (1)$$

$$hei_{it} = \iota_0 + \iota_1 \widehat{mech}_{it}^{k\ OLS} + (\boldsymbol{\iota_2 X'\gamma}) + \alpha_i + \kappa_t + \mu_{it} \quad (2)$$

The dependent variable, $mech_{it}^{k}$, is the mechanism variable as measured in the panel for country $i$ at period $t$. $k$ is a specific indicator, depending on which of the mechanisms is used in the regression, and $j$ indicates which of the four possible treatment (democracy) variables is used. We regress first the mechanism on the $Demo_{it}^{j}$ variable (Equation 1), both with and without the three control variables ($\boldsymbol{\rho_2 X'\gamma}$) and including the two-way fixed effects. Then, in Equation 2, we take the estimated mechanism $\widehat{mech}_{it}^{k\ OLS}$, and with robust and bootstrapped standard errors we estimate the effect of the part of the mechanism explained by the democratic treatment on heights. The results of using this procedure are reported in Table AI.6 below.

We also propose an "IV"/three-step version, which is presented in Table 9 of the main paper. The first step is the usual first stage of the IV to instrument democracy, and then use the instrumented democracy to measure the effect on the mechanism (equations 3 and 4 below). We then take the estimated mechanism $\widehat{mech}_{it}^{k\ 2SLS}$ and regress height on it (5), as in (2) above.

In both cases the second stage regressions use bootstrapped standard errors as they use the estimated mechanism derived from the first step.

First two steps

$$Demo_{it}^{j} = c_0 + c_1 ColArea_{it} + (\boldsymbol{c_2 X'\gamma}) + \delta_i + \lambda_t + \varepsilon_{it} \quad 1^{st} \text{ stage IV} \quad (3)$$

$$mech_{it}^{k} = \rho_0 + \rho_1 Demo_{it}^{j} + (\boldsymbol{\rho_2 X'\gamma}) + \pi_i + \tau_t + \epsilon_{it} \quad 2^{nd} \text{ stage IV} \quad (4)$$

Third step (bootstrapped SE)

$$hei_{it} = \iota_0 + \iota_1 \widehat{mech}_{it}^{k\ 2SLS} + (\boldsymbol{\iota_2 X'\gamma}) + \alpha_i + \kappa_t + \mu_{it} \quad (5)$$

## Table AI.6. Estimation of Mechanisms using the Two-step Procedure, Controls Included

| Regressions | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Mechanism is: | UCOV | UCOV | GINI | GINI | URB100 | URB100 | RWAY | RWAY | WAR | WAR |
| Mechanism on height | 9.854*** | 2.449*** | -0.431*** | -0.695*** | 0.380*** | -0.361*** | 33.753*** | 16.041*** | -71.292*** | -7.240*** |
| | (3.084) | (0.754) | (0.151) | (0.210) | (0.114) | (0.099) | (8.569) | (5.031) | (26.265) | (2.050) |
| R-squared | 0.976 | 0.972 | 0.976 | 0.972 | 0.977 | 0.972 | 0.976 | 0.972 | 0.977 | 0.973 |
| Democracy measure | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 |
| Democracy on mechanism | 0.071 | 0.300*** | -1.620*** | -1.056*** | 1.918** | -2.168** | 0.021 | 0.046 | -0.009 | -0.116** |
| | (0.059) | (0.069) | (0.359) | (0.321) | (0.834) | (0.859) | (0.043) | (0.046) | (0.059) | (0.054) |
| R-squared | 0.723 | 0.704 | 0.968 | 0.966 | 0.907 | 0.896 | 0.828 | 0.838 | 0.533 | 0.630 |
| Observations | 247 | 291 | 247 | 291 | 243 | 280 | 247 | 290 | 229 | 273 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F_A5). For more details on the construction of these variables, see Appendix I Table AI.3. Controls (PC_GDP (Log), IMO, and PARENT_EDU are not displayed and are drawn from Hatton (2014, H14); see Table AI.1 for their definitions. Full results showing controls' coefficients are available under request. Variables for mechanisms are from H14 as well. The first group includes UCOV: Dummy for universal health coverage; HCOV: GINI: Gini coefficient for income; URB100: Percent of population in urban areas > 100,000, beginning of period; RWAY: Railway miles per 1,000 population; WAR: Number of years of war in the last five years and divided by 5. Standard errors are robust and bootstrapped (500 repetitions) when regressing heights on the estimated mechanisms. (*** p<0.01, ** p<0.05, * p<0.1.). All regressions contain both country fixed effects and year dummies.

## Dynamic Models

In this section we try to dispel concerns about not using lags of the dependent variables in our baseline estimated. We thus include up to two lags of the dependent variable, of GDP per capita, and of the BCFH_A5 variable, and see if their introduction uncovers a specification bias in th ebaslines in Table 1 of the main text. In the next tables, we obtain estimates that are both comparable in significance and size to the ones reported in Table 1 columns (1) and (2) of the main text.

GMM equivalents of the estimates are available under request but do not change substantially the qualitative findings from Tables AI.7, combining lags of heights and per capital GDP, and AI.8, combining lags of heights and democracy

## Table AI.7 – Dynamic 2WFE

| (A) No controls | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| BCFH_A5 | 0.491*** | 0.548*** | 0.476*** | 0.547*** | 0.560*** | 0.534*** | 0.543*** |
| | (0.156) | (0.164) | (0.153) | (0.158) | (0.165) | (0.161) | (0.162) |
| HEIGHT (t-1) | 0.676*** | 0.655*** | 0.718*** | 0.691*** | 0.656*** | 0.699*** | 0.655*** |
| | (0.069) | (0.083) | (0.064) | (0.066) | (0.084) | (0.082) | (0.087) |
| PC GDP | | | 0.210 | 0.338 | -0.180 | 0.179 | 0.341 |
| | | | (0.543) | (0.569) | (0.323) | (0.547) | (0.563) |
| PC GDP (t-1) | | | -0.658 | -0.272 | | -0.572 | -0.260 |
| | | | (0.547) | (0.538) | | (0.542) | (0.535) |
| HEIGHT (t-2) | | 0.003 | | | 0.005 | 0.004 | 0.047 |
| | | (0.070) | | | (0.069) | (0.073) | (0.077) |
| PC GDP (t-2) | | | | -0.645* | | | -0.687* |
| | | | | (0.357) | | | (0.357) |
| Obs | 244 | 232 | 242 | 229 | 232 | 231 | 229 |
| R-squared | 0.988 | 0.988 | 0.989 | 0.989 | 0.988 | 0.989 | 0.989 |
| (B) Controls | | | | | | | |
| | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| BCFH_A5 | 0.467*** | 0.498*** | 0.449*** | 0.500*** | 0.498*** | 0.486*** | 0.494*** |
| | (0.147) | (0.155) | (0.145) | (0.150) | (0.155) | (0.153) | (0.154) |
| Heights (t-1) | 0.657*** | 0.624*** | 0.694*** | 0.673*** | 0.624*** | 0.665*** | 0.628*** |
| | (0.067) | (0.085) | (0.063) | (0.065) | (0.085) | (0.083) | (0.088) |
| PC GDP | -0.020 | 0.062 | 0.188 | 0.309 | 0.062 | 0.188 | 0.313 |
| | (0.317) | (0.324) | (0.476) | (0.513) | (0.324) | (0.487) | (0.506) |
| PC GDP (t-1) | | | -0.398 | -0.140 | | -0.305 | -0.124 |
| | | | (0.472) | (0.483) | | (0.477) | (0.476) |
| Height (t-2) | | 0.022 | | | 0.022 | 0.019 | 0.057 |
| | | (0.068) | | | (0.068) | (0.072) | (0.076) |
| PC GDP (t-2) | | | | -0.438 | | | -0.486 |
| | | | | (0.355) | | | (0.360) |
| IMO | -0.063*** | -0.069*** | -0.056*** | -0.056** | -0.069*** | -0.062*** | -0.057** |
| | (0.022) | (0.023) | (0.022) | (0.024) | (0.023) | (0.023) | (0.024) |
| PARENT_EDUC | 0.055 | 0.043 | 0.055 | 0.043 | 0.043 | 0.042 | 0.046 |
| | (0.065) | (0.067) | (0.064) | (0.066) | (0.067) | (0.067) | (0.067) |
| Obs | 243 | 232 | 241 | 229 | 232 | 231 | 229 |
| R-squared | 0.989 | 0.988 | 0.989 | 0.989 | 0.988 | 0.989 | 0.989 |

*Notes:* The dependent variable is five-year averages of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I AI3. In panel B we include controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1). All regressions contain both country and year dummies.

## Table AI.8 – Dynamic 2WFE

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| BCFH_A5 | 0.879*** | 1.012** | 0.853*** | 0.977*** |
| | (0.331) | (0.397) | (0.297) | (0.362) |
| BCFH_A5 (t-1) | -0.541* | -0.809* | -0.478 | -0.757* |
| | (0.319) | (0.453) | (0.294) | (0.409) |
| HEIGHT (t-1) | 0.728*** | 0.711*** | 0.703*** | 0.667*** |
| | (0.067) | (0.102) | (0.066) | (0.101) |
| BCFH_A5 (t-2) | | 0.081 | | 0.130 |
| | | (0.266) | | (0.266) |
| HEIGHT (t-2) | | 0.023 | | 0.045 |
| | | (0.109) | | (0.105) |
| PC GDP | | | -0.192 | -0.152 |
| | | | (0.351) | (0.402) |
| IMO | | | -0.053** | -0.068*** |
| | | | (0.022) | (0.025) |
| PARENT_EDUC | | | 0.060 | 0.059 |
| | | | (0.068) | (0.079) |
| Obs | 223 | 192 | 222 | 192 |
| R-squared | 0.989 | 0.989 | 0.989 | 0.989 |

*Notes:* The dependent variable is five-year averages of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I AI3. In panel B we include controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** $p<0.01$, ** $p<0.05$, * $p<0.1$). All regressions contain both country and year dummies.

# Appendix II
**(Not intended for publication)**

## Summary of Tests in Appendix II

This appendix provides a range of further robustness tests of the relationship between democracy and height in the following sections:

- II.A Alternative instrument definitions.
- II.B Alternative measures of democracy from the same sources used in the main text
- II.C Controlling for trends in heights
- II.D Controlling for years of World War and countries involved
- II.E Changing exposure durations
- II.F Sensitivity to the exclusion of countries and years.
- II.G 2SLS results excluding never-coloniser countries
- II.H Falsification test using a system IV
- II.I Event study: further results
- II.J Effect of democratic reversals
- II.K Independent effect of social expenditure
- II.L Effect of social movements.

## II.A Alternative instrument definitions

In Table II.A, we show results obtained by using as an instrument a colonial dummy equal to 0 if the country has no colonial territory, and one if the colonised territory is strictly positive. We report full 1st and 2nd stage results. As the table shows, the first stage coefficients in Panel B are all negative and significant. The second stage coefficients are also significant with somewhat larger coefficients than their equivalents in Table 4.

**Table IIA.1. IV Results with Colonial Status Instrument as a Dummy**

| Panel A | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Democratic treatment is | BCFH_A5 | BMR_F_A5 | BCFH_A5 | BMR_F_A5 |
| Democracy | 1.636*** | 2.573*** | 1.459*** | 2.515** |
| | (0.468) | (0.881) | (0.521) | (1.054) |
| PC_GDP (Log) | | | 0.257 | -0.121 |
| | | | (0.486) | (0.593) |
| IMO | | | -0.086*** | -0.085*** |
| | | | (0.027) | (0.028) |
| PARENT_EDUC | | | 0.128 | -0.019 |
| | | | (0.087) | (0.119) |
| Observations | 255 | 255 | 247 | 247 |
| R-squared | 0.972 | 0.969 | 0.975 | 0.970 |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Min Eigenvalue | 42.89 | 19.66 | 36.85 | 14.64 |
| F-stat | 38.70 | 16.87 | 30.92 | 12.21 |
| Stock Yogo 10% threshold | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin p-val | 0.0461 | 0.0216 | 0.0778 | 0.0270 |
| Hausman-Wu p-val | 0.0669 | 0.0347 | 0.108 | 0.0436 |
| Panel B (1ststage) | | | | |
| IV (Colonial Dummy) | -0.404*** | -0.257*** | -0.393*** | -0.228*** |
| | (0.065) | (0.063) | (0.071) | (0.065) |
| PC_GDP (log) | | | 0.050 | 0.179 |
| | | | (0.144) | (0.135) |
| IMO | | | -0.002 | -0.001 |
| | | | (0.008) | (0.007) |
| PARENT_EDUC | | | -0.008 | 0.054** |
| | | | (0.030) | (0.025) |
| Observations | 255 | 255 | 247 | 247 |
| R-squared | 0.768 | 0.797 | 0.763 | 0.804 |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |

*Notes*: These regressions replicate 2SLS results in columns 2 and 4 of Table 4 in the main text. The only difference is the instrument is a dummy equal to 1 if the country has any colonial territory or 0 if otherwise.

## II.B Alternative definitions of democracy from BMR and Polity

Tables II.B.1 to II.B.4 show that our baseline/preferred estimates are robust to several alternative definitions of the democratic treatment using the same data sources used in the main text.

Concerning first Table IIB.1, presenting 2WFE regressions results. BMR_D (columns 1 and 7) is the original dummy from BMR13; BMR_D_A5(6), (columns 2 and 8) is the dummy created from the original BMR13 dummy; the average number of years out of five a country has spent in democratic status is first calculated. If the result is more or equal than three years (60% of the total time) then the country status is considered a democracy. BMR_F_A5(8), used in columns 3 and 9, is the dummy created from the original BMR_F dummy, which is the dummy including the criteria that more than 50% of adult women are allowed to vote. The average number of years out of five a country has spent in democratic status if first calculated. If the result is more than or equal to 4 years (80% of the total time) then the country status is considered a democracy. BMR_F_A5(10), used in columns 4 and 10, is similarly calculated, but a country had to be democratic all the five years from t-4 to t. BCFH_D(8), columns 5 and 11, means that the dummy is created when the country has been a democracy for more than four years in the last five, i.e. 80% of the time. Recall that our main variable is BCFH_D(6), where a country is classified as democratic if it has been a democracy for at least three of the last five years (equal or more than 60% of the time). We report 2WFE and IV estimates, as well as estimates with and without the three main controls used throughout. Finally BCFH_D(10) definition (columns 6 and 12) follows in a straightforward manner. The difference between the top and bottom panel of the table is the use of the usual controls (PARENT_EDU, IMO, PC_GDP (log)) in the bottom panel, while top panel results omit the controls.

**Table IIB.1. BMR and alternative BCFH definitions (2WFE)**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Alt. Defintion | BMR_D | BMR_D_A5(6) | BMR_F_A5(8) | BMR_F_A5(10) | BCFH_D(8) | BCFH_D(10) |
| Demo coeff. | 0.553*** | 0.560*** | 0.868*** | 0.712*** | 0.794*** | 0.723*** |
| | (0.056) | (0.057) | (0.088) | (0.072) | (0.080) | (0.073) |
| | 2.840 | 2.752 | 3.752 | 3.114 | 3.534 | 3.319 |
| Observations | 294 | 293 | 301 | 301 | 256 | 256 |
| R-squared | 0.968 | 0.968 | 0.969 | 0.968 | 0.975 | 0.974 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | × | × |
| | (7) | (8) | (9) | (10) | (11) | (12) |
| Alt. Definition | BMR_D | BMR_D_A5(6) | BMR_F_A5(8) | BMR_F_A5(10) | BCFH_D(8) | BCFH_D(10) |
| Demo coeff. | 0.485*** | 0.514*** | 0.708*** | 0.575*** | 0.698*** | 0.639*** |
| | (0.049) | (0.053) | (0.073) | (0.059) | (0.071) | (0.065) |
| | 2.615 | 2.717 | 3.213 | 2.703 | 3.278 | 3.098 |
| Observations | 284 | 283 | 291 | 291 | 247 | 247 |
| R-squared | 0.971 | 0.971 | 0.972 | 0.971 | 0.976 | 0.976 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* Robustness checks using alternative definitions of democracy: 2WFE. Controls are the ones used throughout the main text (PARENT_EDUC, PC_GDP, IMO). Please see Table AI.1 for definitions.

The organisation of table IIB.2 follows IIB.1, but it presents 2SLS/IV results. F-stats and the coefficient obtained from first stage regressions (instrument AREA_COLONY_A10) are reported.

**Table IIB.2. BMR and alternative BCFH (IV)**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Demo version | BMR_D | BMR_A5(6) | BMR_F_A5(8) | BMR_F_A5(10) | BCFH_D(8) | BCFH_D(10) |
| Demo coef. | 1.319*** | 1.407*** | 2.102*** | 2.227*** | 1.102*** | 1.093*** |
| | (0.386) | (0.400) | (0.683) | (0.761) | (0.355) | (0.352) |
| Observations | 293 | 292 | 300 | 300 | 255 | 255 |
| R-squared | 0.966 | 0.965 | 0.964 | 0.962 | 0.974 | 0.974 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year dummies | × | × | × | × | × | × |
| Controls | × | × | × | × | × | × |
| AREA_COLONY_A10 | -0.040*** | -0.039*** | -0.023*** | -0.022*** | -0.041*** | -0.042*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| F-stat | 53.42 | 52.32 | 22.26 | 18.71 | 65.69 | 64.47 |
| | (7) | (8) | (9) | (10) | (11) | (12) |
| Demo version | BMR_D | BMR_D_A5(6) | BMR_F_A5(8) | BMR_F_A5(10) | BCFH_D(8) | BCFH_D(10) |
| Demo coef. | 1.043*** | 1.130*** | 1.619*** | 1.705*** | 1.035*** | 1.026*** |
| | (0.366) | (0.378) | (0.606) | (0.655) | (0.378) | (0.374) |
| Observations | 284 | 283 | 291 | 291 | 247 | 247 |
| R-squared | 0.970 | 0.970 | 0.969 | 0.968 | 0.976 | 0.976 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year dummies | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| AREA_COLONY_A10 | -0.041*** | -0.039*** | -0.024*** | -0.022*** | -0.041*** | -0.041*** |
| | (0.006) | (0.006) | (0.005) | (0.005) | (0.005) | (0.005) |
| F-stat | 52.77 | 50.71 | 22.54 | 19.48 | 57.65 | 56.87 |

*Notes:* Robustness checks using alternative definitions of democracy: IV results. Controls are the ones used throughout the main text (PARENT_EDUC, PC_GDP, IMO). IV is variable AREA_COLONY_A10. Please see Table AI.1 for definitions.

In Tables IIB.3 (2WFE) and IIB.4 (IV) we use *alternative polity-based measures* and we also modify the definition of the dummy derived from the polity score. Recall, in the main text the dummy is equal to one if the polity score is weakly greater than zero. Then this definition is used to construct our preferred measure BCFH_A5 and thus, though indirectly, can influence our results. Referring to table IIB.3, regressions displayed in columns 1 to 7 (Panel A) do not use the controls (PARENT_EDU, IMO, PC_GDP (log)), while 8 to 14 do so (Panel B). We first use the original polity score (columns 1 and 8), and a (t-4, t) average of the value (columns 2 and 9). We then use the dummy version (P_A5_D(6)) calculated to construct the main BCFH_A5 dummy (columns 3 and 10). We also use the simple dummy using value 0 as threshold of the (t-4, t) averaged score (columns 4 and 11). We then apply *alternative thresholds* to transform the polity score into a dummy. For this we use the sample mean (about 3.7, variable P_A5_D_mean, columns 5 and 12) and the sample median value (about 6.7, variable P_A5_D_median, columns 6 and 13), of the polity distribution, which reveals its left-skewness. Finally, we normalise the (t-4, t) averaged polity score in a 0-1 continuous interval variable (P_A5_Int, columns 7 and 14). Table IIB.3 reports the results with these different definitions using 2WFEwithout controls (panel A) and with controls (panel B), with all versions giving significant positive coefficients. Table IIB.4 reports the IV results for the same versions of democracy. Interestingly the three measures used in columns (4) to column (6) of panel A in Table IIB.4 (no controls), show that as the requirement for creating a dummy is restricted and made more "demanding" by increasing the threshold values, the coefficient estimates increase from 0.974 (0-threshold) to 1.241 (mean threshold) to 1.437(median threshold), revealing that there is also a "quantity" effect of democracy on heights. The interpretation, however, is not straightforward because the increase in the polity index can be attributed to the increase of one of the several dimensions that comprise it. While some intensity effect is thus present, we cannot say which democratic dimension is more relevant as two countries might have the same polity index level, but composed of different dimensions.

**Table IIB.3. Polity-based Categorical Measures and Dummies. Test of Polity Intensity Effects (2WFE)**

| Panel A | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Demo version | P | P_A5 | P_A5_D(6) | P_A5_D | P_A5_D_mean | P_A5_D_median | P_A5_int |
| Demo coef. | 0.036*** | 0.042*** | 0.631*** | 0.652*** | 0.628*** | 0.468** | 0.250*** |
| | (0.050) | (0.057) | (0.062) | (0.064) | (0.063) | (0.048) | (0.070) |
| Obs. | 279 | 264 | 264 | 264 | 264 | 264 | 264 |
| R-squared | 0.970 | 0.974 | 0.974 | 0.975 | 0.974 | 0.973 | 0.974 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | × | × | × |
| Panel B | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| Demo version | P | P_AC | P_A5_D(6) | P_A5_D | P_A5_D_mean | P_A5_D_median | P_A5_int |
| Demo coef. | 0.029** | 0.040*** | 0.556*** | 0.583*** | 0.602*** | 0.530*** | 0.236*** |
| | (0.041) | (0.055) | (0.055) | (0.057) | (0.061) | (0.055) | (0.067) |
| Obs. | 270 | 255 | 255 | 255 | 255 | 255 | 255 |
| R-squared | 0.972 | 0.976 | 0.976 | 0.976 | 0.976 | 0.976 | 0.976 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* Robustness checks using alternative definitions of democracy. IV results. In all regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Controls are the ones used throughout the main text (PARENT_EDUC, PC_GDP, IMO). IV is variable AREA_COLONY_A10. Please see Table AI.1 for definitions.

## Table IIB.4. Polity-Based Categorical Measures and Dummies. Test of Intensity Effects (IV)

| Panel A | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | P | P_A5 | P_A5_D(6) | P_A5_D | P_A5_D_mean | P_A5_D_median | P_A5_int |
| Demo coef. | 0.081*** | 0.083*** | 0.972*** | 0.974*** | 1.241*** | 1.437*** | 0.395*** |
| | (0.030) | (0.031) | (0.355) | (0.357) | (0.479) | (0.532) | (0.144) |
| Obs. | 278 | 263 | 263 | 263 | 263 | 263 | 263 |
| R-squared | 0.968 | 0.973 | 0.974 | 0.974 | 0.972 | 0.970 | 0.974 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | × | × | × |
| IV coef. 1st stage | -0.540*** | -0.513*** | -0.044*** | -0.044*** | -0.034*** | -0.030*** | -0.108*** |
| | (0.088) | (0.086) | (0.007) | (0.007) | (0.007) | (0.006) | (0.017) |
| F-stat. | 37.36 | 35.30 | 44.30 | 43.12 | 25.94 | 25.89 | 40.03 |
| Panel B | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| | P | P_A5 | P_A5_D(6) | P_A5_D | P_A5_D_mean | P_A5_D_median | P_A5_int |
| Demo coef. | 0.070** | 0.074** | 0.887** | 0.894** | 1.100** | 1.193** | 0.349** |
| | (0.031) | (0.031) | (0.377) | (0.380) | (0.473) | (0.476) | (0.144) |
| Obs. | 270 | 255 | 255 | 255 | 255 | 255 | 255 |
| R-squared | 0.971 | 0.975 | 0.976 | 0.976 | 0.975 | 0.974 | 0.976 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| IV coef. 1st stage | -0.522*** | -0.496*** | -0.042*** | -0.041*** | -0.034*** | -0.031*** | -0.106*** |
| | (0.087) | (0.085) | (0.007) | (0.007) | (0.007) | (0.006) | (0.017) |
| F-stat | 35.89 | 33.79 | 40 | 38.85 | 26.37 | 30.25 | 39.87 |

*Notes:* Robustness checks using alternative definitions of democracy: IV results. In all IV regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Controls are the ones used throughout the main text (PARENT_EDUC, PC_GDP, IMO). V is variable AREA_COLONY_A10. Please see Table AI.1 for definitions.

## II.C Controlling for trends

Technology is often regarded as one of the main confounding factors in regressions such as ours. In this section we add both linear (Trend) and quadratic (Trend square) trends as controls in place of year dummies. We report OLS estimates (Table IIC.1) and IV estimates (Table IIC.2), both excluding and including controls. In the latter case, the instrument is still variable AREA_COLONY_A10. In these more restricted specifications the coefficients on democracy remain positive and significant in each case. Not surprisingly there is evidence of a strong upward trend, indicating that much of the overall increase in height is not accounted for by the variables in the model even when controls are included. This increase is captured mainly by the positive and strongly significant quadratic term, which reflects the acceleration in height in the 20th century.

**Table IIC.1. Including Quadratic Trends (2WFE)**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Democracy Measure | BCFH_A5 | BCFH_A5 | BMR_F_A5 | BMR_F_A5 |
| Demo coef. | 0.592** | 0.474** | 0.953*** | 0.761*** |
| | (0.247) | (0.229) | (0.241) | (0.219) |
| Trend | 0.028** | 0.022 | 0.017 | 0.016 |
| | (0.013) | (0.014) | (0.012) | (0.011) |
| Trend squared (×100) | 0.034*** | 0.019*** | 0.036*** | 0.017*** |
| | (0.005) | (0.006) | (0.005) | (0.006) |
| Observations | 256 | 247 | 301 | 291 |
| R-squared | 0.966 | 0.970 | 0.960 | 0.966 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year dummies | × | × | × | × |
| Controls | × | ✓ | × | ✓ |

*Notes:* In all the regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Democratic treatment variable is a democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the. For more details on the construction of these variables, see Appendix I, AI3. Controls (PARENT_EDU, PC_GDP, IMO) are drawn from Hatton (2014, H14), see Table AI1. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses. As usual, *** p<0.01, ** p<0.05, * p<0.1. All regressions contain both country and year dummies.

## Table IIC.2. Including quadratic trends (IV)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Democracy Measure | BCFH_A5 | BCFH_A5 | BMR_F_A5 | BMR_F_A5 |
| Demo coef. | 0.815** | 0.745** | 1.641** | 1.422** |
| | (0.367) | (0.364) | (0.679) | (0.633) |
| Trend | 0.025* | 0.016 | 0.018 | 0.015 |
| | (0.014) | (0.014) | (0.012) | (0.011) |
| Trend squared (×100) | 0.034*** | 0.021*** | 0.033*** | 0.016*** |
| | (0.005) | (0.007) | (0.006) | (0.006) |
| Observations | 255 | 247 | 300 | 291 |
| R-squared | 0.965 | 0.970 | 0.958 | 0.965 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year dummies | × | × | × | × |
| Controls | × | ✓ | × | ✓ |
| IV first stage coef. | -0.050*** | -0.051*** | -0.026*** | -0.027*** |
| | (0.005) | (0.006) | (0.006) | (0.006) |
| F-stat | 84.66 | 79.19 | 19.78 | 20.60 |

*Notes:* In all IV regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Democratic treatment variable is a democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the adult female population with the right to vote. For more details on the construction of these variables, see Appendix I, AI3. Controls (PARENT_EDU, PC_GDP, IMO) are drawn from Hatton (2014, H14), see Table AI1. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses. As usual, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All regressions contain both country and year dummies. Instrument (IV) is the log of the moving average (t-9, t) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), and originally expressed in $km^2$. Colonial relationships in dyadic form are taken from WM06. In all regressions we report the 1st stage regression coefficient with significance level and the F-statistic.

## II.D Controlling for World War Years and Countries Involved

Missing observations in our panel are not random and they reflect the lack of information on heights and democracy during world wars. This is especially because the Polity index in several cases does not classify a country as democratic or not during the world wars. This is less important when looking at the information provided by BMR18, where an effort is made to classify a country also during world wars. Therefore, we have several cases where the lack of information is correlated with democratic transitions before and after the two world wars and period-to-period increases in heights due to the lack of data during wars. We also consider if and how these effects are mitigated by the negative effect that world wars likely produced on heights. To control for this possible bias, we list in Table IID.1 all the cases where a country transitioned before and after any of the two world wars, and created a dummy (WWINT) capturing all the country/periods involving the two war periods, 1914-1918 and 1939-1945. In Tables IID.2 and IID.3 we report 2WFE estimates, without and with controls respectively. Our estimates are robust to the inclusion of this dummy as well as to the inclusion of the variable WAR, which is an average of how many of the previous five years a country has spent in war.

**Table IID.1. Construction of WWINT Variable**

| War periods: [1914:1918] ; [1939:1945] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| iso3c | year | Height cm | Polity Dummy | BMR Dummy | BCFH_A5 Dummy | iso3c | year | Height cm | Polity Dummy | BMR Dummy | BCFH_A5 Dummy |
| AUT | 1915 | 169.51 | 0 | 0 | 0 | FRA | 1915 | 168.92 | 1 | 1 | 1 |
| AUT | 1940 | 173.06 | --- | 0 | --- | FRA | 1920 | 169.2 | 1 | 1 | 1 |
| AUT | 1945 | 174.46 | --- | 0 | --- | FRA | 1935 | 169.37 | 1 | 1 | 1 |
| AUT | 1950 | 174.8 | 1 | 1 | 1 | FRA | 1940 | 170.41 | 1 | 1 | 1 |
| DEU | 1935 | 173.88 | 0 | 0 | 0 | FRA | 1945 | 171.7 | | 0 | |
| DEU | 1940 | 174.9 | 0 | 0 | 0 | FRA | 1950 | 171.7 | 1 | 1 | 1 |
| DEU | 1945 | 175.47 | --- | 0 | --- | GRC | 1935 | 167.2 | 1 | 1 | 1 |
| DEU | 1950 | 176.35 | 1 | 0 | 0 | GRC | 1940 | 167.4 | 0 | 0 | 0 |
| ESP | 1915 | 165.81 | 1 | 0 | 0 | GRC | 1945 | 167.18 | --- | 0 | --- |
| ESP | 1920 | 165.71 | 1 | 0 | 0 | GRC | 1950 | 170.3 | 1 | 1 | 1 |
| ESP | 1935 | 166.13 | 1 | 1 | 1 | ITA | 1945 | 168.93 | --- | 0 | --- |
| ESP | 1940 | 166.75 | 1 | 0 | 0 | ITA | 1950 | 169.75 | --- | 1 | --- |
| ESP | 1945 | 167.26 | 0 | 0 | 0 | NLD | 1915 | 173.24 | 0 | 1 | 0 |
| ESP | 1950 | 167.65 | 0 | 0 | 0 | NLD | 1920 | 174 | 1 | 1 | 1 |

*Notes:* List of all the 28 cases where a country transitioned right before and after any of the two world wars. A dummy (WWINT) is then created capturing all the country/periods involving the two war periods, 1914-1918 and 1939-1945in which democratic transitions occurred as well.

## Table IID.2. Regressions Including War Variables (2WFE)

| VARIABLES | (1) BCFH_A5 | (2) BCFH_A5 | (3) BMR_F_A5 | (4) BMR_F_A5 | (5) BCFH_A5 | (6) BCFH_A5 | (7) BMR_F_A5 | (8) BMR_F_A5 |
|---|---|---|---|---|---|---|---|---|
| Democracy | 0.797*** | 0.700*** | 0.910*** | 1.035*** | 0.701*** | 0.621*** | 0.753*** | 0.855*** |
| | -0.08 | -0.07 | -0.093 | -0.103 | -0.071 | -0.063 | -0.078 | -0.087 |
| | 3.535 | 2.929 | 3.909 | 4.051 | 3.28 | 2.785 | 3.322 | 3.423 |
| War | | -0.052 | | 0.541* | | -0.11 | | 0.467* |
| | | (-0.002) | | -0.032 | | (-0.005) | | -0.028 |
| | | -0.096 | | 1.908 | | -0.238 | | 1.695 |
| Demo × War | | 0.196 | | 0.306 | | 0.287 | | 0.321 |
| | | -0.006 | | -0.01 | | -0.01 | | -0.011 |
| | | 0.36 | | 0.715 | | 0.651 | | 0.771 |
| Treat × WWInt | -0.158 | | -0.252 | | -0.151 | | -0.374 | |
| | (-0.003) | | (-0.004) | | (-0.003) | | (-0.007) | |
| Observations | 256 | 238 | 301 | 283 | 247 | 229 | 291 | 273 |
| R-squared | 0.975 | 0.975 | 0.969 | 0.971 | 0.976 | 0.977 | 0.972 | 0.973 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | ✓ | ✓ | ✓ | ✓ |

*Notes*: In all 2WFE regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Democratic treatment variable is a democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the adult female population with the right to vote (BMR_F_A5). For more details on the construction of these variables, see Appendix I, AI3. War dummies created as described above and reported in Table III.D. Controls (PARENT_EDU, PC_GDP, IMO) are drawn from Hatton (2014, H14), see Table AI1. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses. As usual, *** p<0.01, ** p<0.05, * p<0.1. All regressions contain both country and year dummies.

## II.E Exposures

This section is called "exposures" because it includes regressions where the baseline dummy (t-4, t) is augmented with a 10 year forward average (f10 variables averaging from t-4 to t+10), and the resulting value then converted into a dummy if more than 60% of the years were passed in a democratic political status in the 15-year span. When we forward an additional ten years, we are calculating the exposure to democracy that spans for the *first 10 to 15 years of life of a cohort*, while by comparison, the dummy of our baseline estimates covers on average the first five years. Interestingly, there is a general increase in the coefficients both for the 2WFE analysis in Tables IIE.1 and IIE.2 when only male enfranchisement is considered (changes between BCFH_A5 and BCFH_A5_f10 in columns 1 to 2 and 5 to 6 in both tables). For example, considering the change between columns 1 (column 2 in Table 1 in the main text) and 2 of Table IIE.1 the marginal increase in the effect on heights is about 22.5% from the baseline estimate. This increase in the effect is not confirmed in the IV regressions for dummies that include female enfranchisement. However, the increase in exposure is consistent for measures of democracy that include only male enfranchisement. This should be taken as evidence that, while most of the gain in height lies within the first years of life, there is still another non-trivial 18-20% which can be attributed to the well-known adolescent growth spurt.

**Table IIE.1. Regressions with Different Exposures (2WFE)**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Exposure | BCFH_A5 | BCFH_A5 f10 | BMR_F_A5 | BMR_F_A5 f10 | BCFH_A5 | BCFH_A5 f10 | BCFH_A5 | BCFH_A5 f10 |
| Demo | 0.794*** | 0.973*** | 0.899*** | 1.125*** | 0.698*** | 0.859*** | 0.734*** | 0.919*** |
| | (0.080) | (0.094) | (0.092) | (0.116) | (0.071) | (0.083) | (0.076) | (0.096) |
| Obs. | 256 | 218 | 301 | 301 | 247 | 211 | 291 | 291 |
| R-squared | 0.975 | 0.979 | 0.969 | 0.970 | 0.976 | 0.982 | 0.972 | 0.972 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | ✓ | ✓ | ✓ | ✓ |

*Notes*: in all regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured.

**Table IIE.2. Regressions with Different Exposures (IV)**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Exposure | BCFH_A5 | BCFH_A5 f10 | BMR_F_A5 | BMR_F_A5 f10 | BCFH_A5 | BCFH_A5 f10 | BMR_F_A5 | BMR_F_A5 f10 |
| Demo coef. | 1.102*** | 1.344*** | 2.201*** | 1.952*** | 1.035*** | 1.198** | 1.707*** | 1.557*** |
| | (0.355) | (0.465) | (0.714) | (0.605) | (0.378) | (0.506) | (0.636) | (0.581) |
| Obs. | 255 | 217 | 300 | 300 | 247 | 211 | 291 | 291 |
| R-squared | 0.974 | 0.979 | 0.964 | 0.968 | 0.976 | 0.981 | 0.969 | 0.971 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | ✓ | ✓ | ✓ | ✓ |
| IV | -0.041*** | -0.036*** | -0.022*** | -0.025*** | -0.041*** | -0.034*** | -0.022*** | -0.025*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| F-stat | 65.69 | 46.71 | 19.97 | 29.03 | 57.65 | 38.46 | 19.96 | 25.89 |

*Notes:* In all regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured.

## II.F Sensitivity to excluding observations by country and year

Our results may depend on particular high leverage observations or clusters, which is a concern especially for IV estimates (Young, 2017). Here we report the coefficient estimates for two measures of democracy (*all regressions including the set of three controls used throughout the paper*) when dropping, in turn, each country and each year. Tables IIF.1 reports the 2WFE coefficients when individual countries are dropped. The coefficients are significant at the 1 per cent level with only two exceptions. Table IIF.2 reports the coefficients when individual years are dropped. In this case all the coefficients are significant at the 1 per cent level. Overall, these results suggest that our findings are not crucially dependent on one country or period.

**IIF.1. 2WFE Coefficients by Country Exclusion**

| Country Omitted | Reg | Coeff. | Std Dev | Reg | Coeff. | Std Dev |
|---|---|---|---|---|---|---|
| | | BCFH_A5 | | | BMR_F_A5 | |
| AUT | 1 | 0.819*** | (0.218) | 16 | 0.780*** | (0.227) |
| BEL | 2 | 0.842*** | (0.228) | 17 | 0.799*** | (0.230) |
| DEU | 3 | 0.768*** | (0.225) | 18 | 0.852*** | (0.236) |
| DNK | 4 | 0.612*** | (0.212) | 19 | 0.747*** | (0.228) |
| ESP | 5 | 0.666*** | (0.219) | 20 | 0.744*** | (0.223) |
| FIN | 6 | 0.684*** | (0.213) | 21 | 0.713*** | (0.220) |
| FRA | 7 | 0.567** | (0.229) | 22 | 0.736*** | (0.231) |
| GBR | 8 | 0.561** | (0.223) | 23 | 0.709*** | (0.224) |
| GRC | 9 | 0.757*** | (0.207) | 24 | 0.715*** | (0.218) |
| IRL | 10 | 0.698*** | (0.213) | 25 | 0.735*** | (0.219) |
| ITA | 11 | 0.733*** | (0.234) | 26 | 0.735*** | (0.237) |
| NLD | 12 | 0.616*** | (0.224) | 27 | 0.691*** | (0.234) |
| NOR | 13 | 0.761*** | (0.216) | 28 | 0.643*** | (0.226) |
| PRT | 14 | 0.594** | (0.234) | 29 | 0.588*** | (0.219) |
| SWE | 15 | 0.797*** | (0.237) | 30 | 0.787*** | (0.241) |

## IIF.2. 2WFE Coefficients by 5-year Exclusion

| Year Omitted | Reg | Coef | Std | Reg | Coef | Std |
|---|---|---|---|---|---|---|
| | | BCFH_A5 | | | BMR_F_A5 | |
| 1860 | 1 | 0.698*** | (0.213) | 26 | 0.734*** | (0.219) |
| 1865 | 2 | 0.678*** | (0.215) | 27 | 0.686*** | (0.218) |
| 1870 | 3 | 0.672*** | (0.214) | 28 | 0.684*** | (0.218) |
| 1875 | 4 | 0.698*** | (0.215) | 29 | 0.707*** | (0.220) |
| 1880 | 5 | 0.691*** | (0.215) | 30 | 0.709*** | (0.220) |
| 1885 | 6 | 0.636*** | (0.215) | 31 | 0.705*** | (0.219) |
| 1890 | 7 | 0.654*** | (0.220) | 32 | 0.730*** | (0.220) |
| 1895 | 8 | 0.655*** | (0.221) | 33 | 0.738*** | (0.221) |
| 1900 | 9 | 0.666*** | (0.223) | 34 | 0.724*** | (0.222) |
| 1905 | 10 | 0.781*** | (0.221) | 35 | 0.746*** | (0.222) |
| 1910 | 11 | 0.782*** | (0.219) | 36 | 0.728*** | (0.221) |
| 1915 | 12 | 0.699*** | (0.230) | 37 | 0.738*** | (0.230) |
| 1920 | 13 | 0.729*** | (0.228) | 38 | 0.802*** | (0.233) |
| 1925 | 14 | 0.665*** | (0.217) | 39 | 0.695*** | (0.232) |
| 1930 | 15 | 0.723*** | (0.213) | 40 | 0.699*** | (0.229) |
| 1935 | 16 | 0.854*** | (0.217) | 41 | 0.794*** | (0.218) |
| 1940 | 17 | 0.664*** | (0.214) | 42 | 0.743*** | (0.232) |
| 1945 | 18 | 0.695*** | (0.216) | 43 | 0.727*** | (0.232) |
| 1950 | 19 | 0.747*** | (0.219) | 44 | 0.777*** | (0.228) |
| 1955 | 20 | 0.686*** | (0.221) | 45 | 0.704*** | (0.226) |
| 1960 | 21 | 0.682*** | (0.221) | 46 | 0.741*** | (0.228) |
| 1965 | 22 | 0.652*** | (0.219) | 47 | 0.717*** | (0.223) |
| 1970 | 23 | 0.742*** | (0.201) | 48 | 0.767*** | (0.224) |
| 1975 | 24 | 0.678*** | (0.215) | 49 | 0.865*** | (0.224) |
| 1980 | 25 | 0.656*** | (0.215) | 50 | 0.690*** | (0.220) |

## II.G Excluding non-coloniser countries

In our sample four countries, Finland, Greece, Ireland, and Norway, have never been colonisers. In Table IIG.1 we show that never colonisers are more democratic on average than coloniser countries, which is consistent with the argument justifying our instrument, but may influence our results. Table IIG.2 shows that the 2nd stage IV coefficient in the presence of controls remains strongly significant with somewhat larger coefficients than in Table 4 where all countries are included.

**Table IIG.1. Descriptive Statistics for Coloniser and Non-coloniser countries**

| Country | BCFH_A5 | BMR_F_A5 | Height (cm, average) | Log of km sq. of colonised area (average) |
|---|---|---|---|---|
| | | COLONISERS | | |
| AUT | 0.37 | 0.33 | 171.67 | 7.32 |
| BEL | 0.67 | 0.29 | 171.49 | 12.60 |
| DEU | 0.39 | 0.37 | 173.06 | 8.27 |
| DNK | 0.55 | 0.52 | 173.17 | 5.96 |
| ESP | 0.05 | 0.08 | 166.66 | 10.38 |
| FRA | 1.00 | 0.28 | 169.96 | 15.21 |
| GBR | 0.79 | 0.54 | 172.16 | 15.75 |
| ITA | 0.29 | 0.28 | 167.39 | 5.76 |
| NLD | 0.48 | 0.48 | 173.79 | 13.47 |
| PRT | 0.33 | 0.07 | 167.47 | 13.82 |
| SWE | 0.55 | 0.48 | 174.24 | 5.23 |
| | | NEVER COLONISERS | | |
| FIN | 1.00 | 1.00 | 176.20 | 0.00 |
| GRC | 0.78 | 0.36 | 171.98 | 0.00 |
| IRL | 1.00 | 1.00 | 172.05 | 0.00 |
| NOR | 1.00 | 0.58 | 174.56 | 0.00 |

## Table IIG.2. 2nd Stage IV Results Excluding Non-Coloniser Countries

| | (1) BCFH_A5 | (2) BMR_F_A5 | (3) BCFH_A5 | (4) BMR_F_A5 |
|---|---|---|---|---|
| Democracy | 1.281*** | 2.413*** | 1.292*** | 2.320*** |
| | (0.334) | (0.643) | -0.37 | -0.664 |
| PC_GDP (Log) | | | -0.004 | -0.368 |
| | | | -0.476 | -0.538 |
| IMO | | | -0.083*** | -0.102*** |
| | | | -0.026 | -0.028 |
| PARENT_EDUC | | | 0.116 | 0.068 |
| | | | -0.085 | -0.094 |
| Observations | 218 | 251 | 211 | 243 |
| R-squared | 0.977 | 0.964 | 0.978 | 0.967 |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Min Eigenvalue | 46.76 | 23.80 | 39.87 | 18.73 |
| F-stat | 59.95 | 22.87 | 44.3 | 17.55 |
| Stock Yogo 10% Threshold | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin p-val | 0.276 | 0.006 | 0.2 | 0.009 |

*Notes:* In all IV regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Democratic treatment variable is a democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the adult female population with the right to vote. For more details on the construction of these variables, see Appendix I, AI3. Controls (PARENT_EDU, PC_GDP, IMO) are drawn from Hatton (2014, H14), see Table AI1. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses. As usual, *** $p<0.01$, ** $p<0.05$, * $p<0.1$. All regressions contain both country and year dummies. Instrument (IV) is the log of the moving average (t-9, t) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), and originally expressed in $km^2$. Colonial relationships in dyadic form are taken from WM06. In all regressions we report the 1st stage regression coefficient with significance level and the F-statistic.

## II.H Falsification test using a system IV

Table 6 of the main text reports falsification tests using 2WFE. The exercise conducted for the IV version of our estimates proceeds as follows. To instrument both the current and forward values of the treatment variables, we used the colonial area for the current value, as in Table 4, and its 20-year forward value for the respective forward values of the treatment variable. The first stage is a system of equations using both instruments for each treatment variable in the first stage, and then using both the instrumented treatment variables in the second stage to estimate their effect on heights. Overall this is a 3-equation system estimated with IV.

The three equations are:

$$H_{it} = \xi_1 + \xi_2 D_{it} + \xi_3 D_{it+20} + \boldsymbol{\xi_4'} \boldsymbol{X_{it}} + \pi_i + \tau_t + \varepsilon_{it} \quad (1)$$

$$D_{it} = \alpha_1 + \alpha_2 Inst_{it} + \alpha_3 Inst_{it+20} + \boldsymbol{\alpha_4}' \boldsymbol{X_{it}} + \theta_i + \delta_t + \mu_{it} \quad (2)$$

$$D_{it+20} = \eta_1 + \eta_2 Inst_{it} + \eta_3 Inst_{it+20} + \boldsymbol{\eta_4}' \boldsymbol{X_{it}} + \theta_i + \delta_t + \mu_{it} \quad (3)$$

In Table IIH.1 below we report only the results with controls, also including selected first-stage results in the same table. The results for the BCFH variable confirm the IV results in Table 4, of the text and all the coefficients are significant at 1% (columns 1, 3, and 4) or 5% (column 2). Most importantly, the forward value of the treatment variable is never significant, and the democratic dummies respond consistently to their own-period instruments, revealing the lack of cross-influence of the current/forward instruments on the forward/current democratic dummies. This supports the existence of a channel of transmission between instrument and democratic status by nesting a set of similar falsification tests in the first stage, but currently testing the robustness of the robust conditional correlation between instrument and treatment variable.

## Table IIH.1. Falsification Test using System - IV

| Panel A: *Second-stage regression results* | | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Treat is: | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| Treat (Democracy) | 0.960*** | 0.840** | 2.212*** | 2.001*** |
| | (0.370) | (0.397) | (0.804) | (0.658) |
| TreatF(orward) | -0.321 | 0.178 | -0.002 | -0.003 |
| (4 leads ≈ 20 years) | (0.507) | (0.541) | (0.742) | (0.657) |
| Panel B: *Selected results from the two first-stage regressions* | | | | |
| *1st equation: Treat dependent variable* | (1.1) | (2.1) | (3.1) | (4.1) |
| IV on Treat | -0.047*** | -0.044*** | -0.021*** | -0.023*** |
| | (0.005) | (0.006) | (0.005) | (0.005) |
| IVF (1 cohort forward) | 0.010* | 0.016** | 0.014** | 0.016*** |
| On Treat | (0.006) | (0.007) | (0.006) | (0.006) |
| *2nd equation : TreatF dependent variable* | (1.2) | (2.2) | (3.2) | (4.2) |
| IV on TreatF(orward) | -0.008* | -0.011** | -0.005 | -0.007 |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| IVF(1 cohort forward) | -0.037*** | -0.034*** | -0.023*** | -0.025*** |
| on TreatF(orward) | (0.006) | (0.006) | (0.006) | (0.006) |
| Observations | 250 | 222 | 291 | 291 |
| R-squared | 0.971 | 0.978 | 0.967 | 0.967 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year dummies | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ |

*Notes:* The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are democratic dummies generated by combining the information from Polity4 and BMR13 (BCFH and BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the female population has the right to vote (BMR_F and BMR_F_A5). For more details on the construction of these variables, see Appendix I Table AI.3. Instrument (IV) is the log of the moving average (*t-9, t*) of the total area colonised by country *i* in year *t* (AREA_COLONY_A10), and originally expressed in km$^2$. Colonial relationships in dyadic form are taken from WM06. Controls are drawn from Hatton (2014, H14), see Appendix I Table AI.1. Here we run IV-system estimation with two first-stage equations jointly using the colonial area as usual, and its 4-period forward value. The two dependent variables of the first-stage regressions are, respectively, the democracy measures used throughout the paper (Treat), and its 4-period leading value (TreatF). As these are both treated as endogenous, we use two instruments: the IV used throughout the IV-estimations in the paper, and IVF(orward) obtained by consistently advancing the IV value by four periods, which is 20 years forward. Panel (A) reports the second-stage results demonstrating robustness to including forward values. Panel (B) reports selected first-stage results coefficients from the two first-stage equations. We report, respectively, (a) the estimated coefficient, (b) the robust bootstrapped errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1.). All regressions contain both country fixed effects and year dummies and the full set of controls.

## II.I Event Study using Quadratic and Cubic Trends

Table 8 above reports the results from event studies where the regressions include variables for the number of periods before and after each democratisation event. Those results took as the dependent variable heights not detrended and heights linearly detrended. Here we extend the analysis to using heights detrended with quadratic and cubic trends. This can also be interpreted as allowing for technological change as an element of confounding. Using the BMR democratic dummy (as in Table 8) the regression results, including controls, are reported in Table III.1. In each of these regressions the main democracy effect remains positive and significant at the 5 per cent level. In columns (3) and (4) the coefficients on time before and after democratisation are significantly negative and positive respectively and are very similar between the quadratic and cubic versions. This reflects the similarity between the quadratic and cubic trends illustrated in Figures II.1 A and B, which provide a graphical illustration of the trends within a 30-year window before and after, comparable with that presented in Figure 4 above. Both part (A) and part (B) of the figure show an even sharper discontinuity after democratisation that those presented in Figure 4, providing additional support for the distinct break following democratisation.

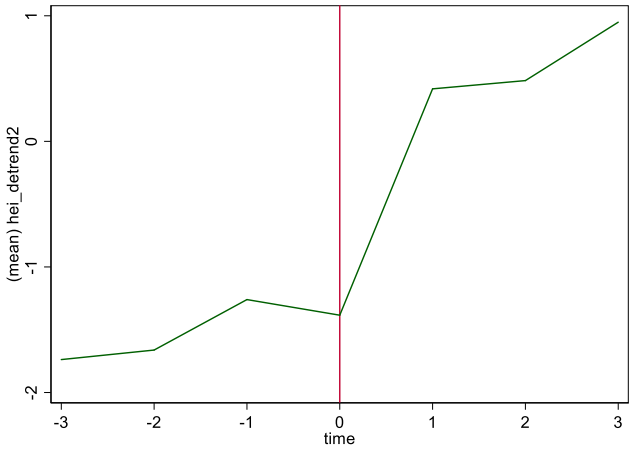
**Table II.I.1. Event Study Regressions Using Detrended Heights (2WFE)**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Heights detrended: | Quadratic | Cubic | Quadratic | Cubic |
| BMR democracy | 0.536** | 0.542** | 0.540** | 0.543** |
| | (0.212) | (0.209) | (0.257) | (0.253) |
| Time | | | -0.0977** | -0.0951** |
| | | | (0.0453) | (0.0447) |
| Time ×BMR demo | | | 0.153*** | 0.150*** |
| | | | (0.0433) | (0.0430) |
| GDP_PC (Log) | 0.248 | 0.277 | 0.683 | 0.703 |
| | (0.599) | (0.585) | (0.604) | (0.591) |
| PARENT_EDUC | 0.188* | 0.186* | 0.176* | 0.174* |
| | (0.0983) | (0.0973) | (0.0983) | (0.0973) |
| IMO | -0.0753** | -0.0759** | -0.167*** | -0.166*** |
| | (0.0313) | (0.0308) | (0.0379) | (0.0375) |
| Constant | -3.860 | -3.990 | -8.137 | -8.181 |
| | (5.642) | (5.518) | (5.597) | (5.480) |
| Observations | 284 | 284 | 284 | 284 |
| R-squared | 0.921 | 0.924 | 0.926 | 0.928 |
| Country FE | ✓ | ✓ | ✓ | ✓ |
| Year FE | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ |

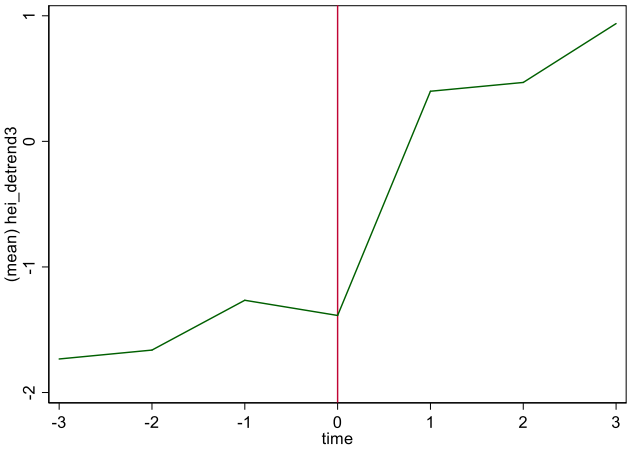
*Notes:* In all IV regressions the dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Democratic treatment variable is a democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH_A5) and by using the BMR13 democracy indicator including stricter conditions for democracy classification by including that at least half of the adult female population with the right to vote. For more details on the construction of these variables, see Appendix I, AI3. Controls (PARENT_EDU, PC_GDP, IMO) are drawn from Hatton (2014, H14), see Table AI1. We report (a) the estimated coefficient, (b) the robust standard errors in parentheses. As usual, *** p<0.01, ** p<0.05, * p<0.1. All regressions contain both country and year dummies.

## Figure II.I.1. Event Study: Trends Before and After Democratisation

(A) Quadratic detrended heights




(B) Cubic detrended heights




*Notes:* Event study using BMR13 dummy for democracy. Heights (on the Y-axis) are detrended using quadratic (A) and cubic (B) trends.

## II.J Effect of temporary reversals to autocracy

As an ultimate robustness test to increase our confidence on the plausibility of a causal mechanism from democracy to heights, we check to see if a reversal to an autocratic regime has a negative effect on heights. To do this, we created a 'REVERSE' variable, based on BMR scores. This dummy is obtained by comparing years after a reversal to autocracy (dummy = 1) with years when a country accomplished an unreversed democratization (dummy = 0). If so, we would expect a negative and statistically significant coefficient. Note, there is a loss in sample size due to dropping year/country combinations when a country was an autocracy since the beginning to the first (and in some cases, the only) democratization event that happened within the 1860-1980 period. The results in Table II.J.1 demonstrate a strong negative coefficient on reversals that is similar in magnitude to the positive coefficient obtained when using the overall index of democracy. This finding is robust to the inclusion of other variables, notably in the presence of significant coefficients on infant mortality and GDP per capita.

**Table II.J.1: Effect of the 'REVERSE' variable**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| REVERSE (BMR) | -1.174*** | -0.809** | -0.651** | -0.648** |
| | (0.328) | (0.344) | (0.302) | (0.301) |
| IMO | | -0.263*** | -0.188*** | -0.179** |
| | | (0.058) | (0.069) | (0.074) |
| PC_GDP (log) | | | 1.868*** | 1.889*** |
| | | | (0.653) | (0.664) |
| PARENT_EDUC | | | | 0.055 |
| | | | | (0.138) |
| Observations | 177 | 177 | 170 | 170 |
| R-squared | 0.957 | 0.962 | 0.967 | 0.967 |

*Notes:* The dependent variable is five-year averages of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Regressions contain both country and year dummies. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1).

## II.K Social movements and social expenditure

If decolonization is correlated with social movements fostering social spending that is in turn correlated with democracy and heights, then we might expect some robust conditional correlation between the instrument and the NEXP variable measuring social expenditure through the mediation pressure from socialist movements. In other words, if decolonization promoted or fostered pro-social movements demanding both more social spending and democratization, the link between socialism and heights should have be channeled through *concrete government efforts* which translated innovative social and political ideas of the time into tangible programs aimed at improving public health, sanitation, and well-being more in general. As in Deaton (2013) and commented on by Weil (2015), innovation in pro-social/socialist ideas and their diffusion has an effect on heights to the extent this translates into concrete steps taken by the state to promote social spending for public programs to improve health and well-being. However, the necessary state capacity to do so should not be taken for granted. We thus expand the independence test in Table 3 of the main text by adding the NEXP variable. Table IV.2 shows no evidence that public expenditure on social services, which we have treated as a mechanism, is a determinant of our colonial area instrument.

**Table II.K.1: Independence test including the NEXP variable**

| | (1) | (2) | (3) |
|---|---|---|---|
| Control variables | | Dep var: Colonial area (IV) | |
| PC_GDP (log) | -2.556 | 0.303 | 0.543 |
| | (1.650) | (0.786) | (0.809) |
| IMO | 0.137 | 0.044 | 0.046 |
| | (0.116) | (0.039) | (0.042) |
| PARENT_EDUC | -0.166 | -0.117 | -0.153 |
| | (0.289) | (0.125) | (0.129) |
| NEXP | 0.051 | 0.006 | 0.019 |
| | (0.113) | (0.046) | (0.046) |
| AREA_COLONY_A10 (Lag 1) | | 1.422*** | 1.525*** |
| | | (0.126) | (0.131) |
| AREA_COLONY_A10 (Lag 2) | | -0.555*** | -0.810*** |
| | | (0.126) | (0.189) |
| AREA_COLONY_A10 (Lag 3) | | | 0.172* |
| | | | (0.090) |
| Observations | 243 | 229 | 220 |
| R-squared | 0.814 | 0.980 | 0.981 |

*Notes: Notes:* The dependent variable is AREA_COLONY_A10 a a ten-year (t-9, t) average of colonial territory expressed as the log of colonial area in $km^2$. We include the usual controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. NEXP, defined as central government expenditure on social services as a percentage of GDP, from H14. Regressions contain both country and year dummies. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

As a further check, we use NEXP to extend the baselines in Tables 1 and 2. This should be enough to shut down mediating variables going from the IV to both democracy and heights, which could create omitted variable bias; for example, the diffusion of socialism and inclusive social and political ideas. As Table II.K.2 shows, the positive sign and the size and significance of the coefficient on NEXP is consistent with expectation formed from the independence test, and its inclusion does little to alter the baseline results (Tables 1 and 2) in the main text.

**Table II.K.2: Baselines extended with NEXP variable**

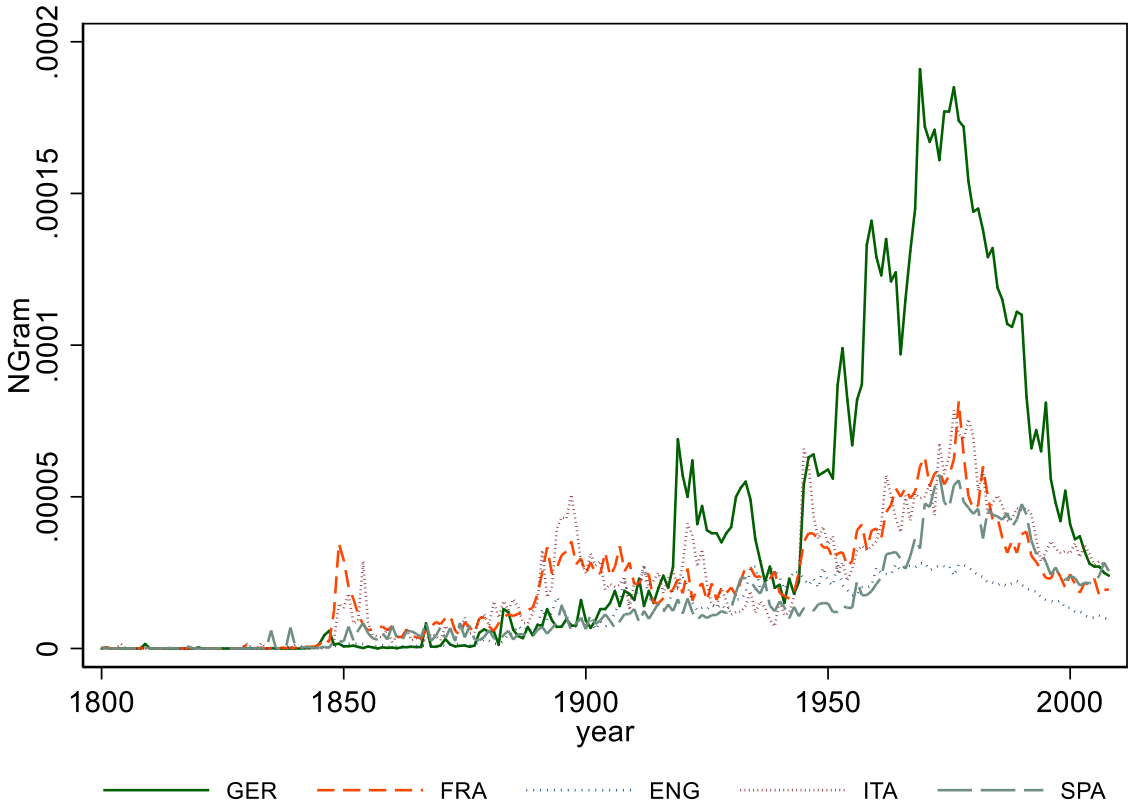
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | 2WFE | | | | 2SLS | | | |
| Democracy | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 | BCFH | BCFH_A5 | BMR_F | BMR_F_A5 |
| | 0.484*** | 0.586*** | 0.741*** | 0.642*** | 1.229*** | 1.253*** | 2.361*** | 2.155*** |
| | (0.183) | (0.195) | (0.216) | (0.207) | (0.343) | (0.356) | (0.708) | (0.601) |
| IMO | -0.125*** | -0.120*** | -0.120*** | -0.121*** | -0.108*** | -0.108*** | -0.113*** | -0.116*** |
| | (0.030) | (0.030) | (0.027) | (0.027) | (0.029) | (0.029) | (0.028) | (0.028) |
| PARENT_EDUC | 0.146 | 0.119 | 0.138 | 0.147* | 0.138 | 0.117 | 0.052 | 0.076 |
| | (0.094) | (0.090) | (0.088) | (0.088) | (0.088) | (0.083) | (0.095) | (0.090) |
| PC_GDP (log) | 0.981** | 0.764* | 0.876** | 0.889** | 0.837** | 0.590 | 0.383 | 0.385 |
| | (0.402) | (0.436) | (0.362) | (0.376) | (0.395) | (0.444) | (0.428) | (0.460) |
| NEXP | 0.082** | 0.090*** | 0.074** | 0.074** | 0.072** | 0.077** | 0.064* | 0.062* |
| | (0.033) | (0.033) | (0.033) | (0.033) | (0.030) | (0.031) | (0.037) | (0.035) |
| Observations | 258 | 243 | 286 | 286 | 258 | 243 | 286 | 286 |
| R-squared | 0.977 | 0.979 | 0.976 | 0.976 | 0.975 | 0.978 | 0.969 | 0.969 |

*Notes:* The dependent variable is five-year averages of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). We include the usual controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. NEXP, is central government expenditure on social services as a percentage of GDP, from H14. Regressions contain both country and year dummies. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** p<0.01, ** p<0.05, * p<0.1).

## II.L Effect of Social Movements

Here we offer a direct test of whether it was the spread of socialist ideas, rather than the advent of democracy *per se*, that influenced heights. Figure II.L.1 shows the frequency of use of the word 'socialism' in publications from 1800 to 2008 for a restricted set of five countries. It ebbs and flows until the 1940s and then rises steeply until the 1970s. Independence tests in Table II.L.1 show that, while there is a negative correlation between this index and colonial area, this disappears when lags of the latter are included. Table II.L.2 shows that, when included in the equation for height, socialism has at best a very weak effect, while democracy remains strongly positive.

**Figure II.L.1: Trends in use of the word 'Socialism' 1800-2008 from Google nGrams View**



## Table II.l.1: Independence tests including Socialism

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| AREA_COLONY_A10 (Lag 1) | | 0.783*** | 1.007*** | 0.969*** |
| | | (0.076) | (0.173) | (0.197) |
| AREA_COLONY_A10 (Lag 2) | | | -0.311** | -0.281 |
| | | | (0.153) | (0.241) |
| AREA_COLONY_A10 (Lag 3) | | | | -0.044 |
| | | | | (0.129) |
| GDP_PC (Log) | 1.209 | 1.693 | 1.795 | 1.756 |
| | (2.506) | (1.844) | (1.680) | (1.656) |
| IMO | 0.267 | 0.180 | 0.196 | 0.254 |
| | (0.201) | (0.174) | (0.207) | (0.255) |
| PARENT_EDUC | -1.283** | -0.340 | -0.309 | -0.296 |
| | (0.537) | (0.259) | (0.249) | (0.248) |
| SOCIALISM | -0.053*** | 0.004 | -0.004 | -0.005 |
| | (0.017) | (0.015) | (0.017) | (0.019) |
| Observations | 110 | 108 | 103 | 98 |
| R-squared | 0.848 | 0.947 | 0.951 | 0.951 |

*Notes:* The dependent variable is AREA_COLONY_A10 a a ten-year (t-9, t) average of colonial territory expressed as the log of colonial area in $km^2$. We include the usual controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. SOCIALISM is taken from Google NGrams (Ngram × 1,000,000, for 5 countries: AUT, DEU, FRA, GBR, ITA, SPA) and regressions contain both country and year dummies. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

## Table II.L.2: 2WFE & 2SLS baselines with SOCIALISM and NEXP

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | BCFH_A5 2WFE | BCFH_A5 2SLS | BCFH_A5 2WFE | BCFH_A5 2SLS |
| Democracy | 0.785** | 2.356*** | 0.810** | 2.567*** |
| | (0.328) | (0.652) | (0.322) | (0.687) |
| IMO | -0.011 | -0.068 | -0.027 | -0.073 |
| | (0.049) | (0.052) | (0.048) | (0.053) |
| PARENT_EDUC | 0.259* | -0.003 | 0.248* | -0.047 |
| | (0.132) | (0.169) | (0.137) | (0.189) |
| GDP_PC (Log) | 1.373** | 0.647 | 1.729*** | 1.025 |
| | (0.597) | (0.755) | (0.595) | (0.734) |
| SOCIALISM | 0.010* | -0.002 | 0.010* | -0.002 |
| | (0.005) | (0.006) | (0.005) | (0.007) |
| NEXP | | | 0.116* | 0.155** |
| | | | (0.065) | (0.077) |
| Observations | 98 | 98 | 96 | 96 |
| R-squared | 0.986 | 0.981 | 0.987 | 0.981 |

*Notes: :* The dependent variable is five-year averages of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). We include the usual controls, all drawn from Hatton (2014, H14); see Appendix I, Table AI1 for details on definitions and original sources. SOCIALISM is taken from Google NGrams (Ngram*1,000,000, for 5 countries: AUT, DEU, FRA, GBR, ITA, SPA), and NEXP, defined as central government expenditure on social services as a percentage of GDP, from H14. Regressions contain both country and year dummies. We report, respectively, (a) the estimated coefficient, (b) the robust standard errors in parentheses below (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

# Appendix III - Additional Heterogeneity Tests

**(Not intended for publication)**

## III.A Heterogeneity by European Region using IV

In Table 10 we presented 2WFE regressions with interactions between democracy and dummies for three major European regions. Here we present the comparable IV results. However, as we only have one instrument, only the main effect is instrumented and not the interaction. The results are presented in Table IIIA.1, with and without controls. For each of the two democratic treatments the main effect is positive and significant, which supports our argument that the main effect is robust to adding interactions for a specific region. But some of the interactions now become negative and marginally significant, reflecting the fact that the coefficient on the instrumented main effect increases in size as compared with the 2WFE coefficient.

**Table IIIA.1. Heterogeneous Effects of Democracy by European Region -- IV Regressions**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BCFH_A5 | | | | | | BMR_F_A5 | | | | | |
| Democracy | 1.205*** | 2.365*** | 1.058*** | 2.443*** | 1.284*** | 2.512*** | 1.122*** | 1.848*** | 1.079** | 1.943** | 0.807 | 1.894** |
| | (0.395) | (0.834) | (0.393) | (0.876) | (0.469) | (0.849) | (0.406) | (0.703) | (0.459) | (0.771) | (0.586) | (0.946) |
| Demo x Southern Europe | -0.695 | -0.677 | | | | | -0.783* | -0.772 | | | | |
| | (0.425) | (0.599) | | | | | (0.418) | (0.522) | | | | |
| Demo x Central Europe | | | 0.185 | -0.628 | | | | | -0.160 | -0.897* | | |
| | | | (0.299) | (0.448) | | | | | (0.394) | (0.541) | | |
| Demo x Northern Europe | | | | | -0.297 | -0.832* | | | | | 0.371 | -0.339 |
| | | | | | (0.319) | (0.447) | | | | | (0.477) | (0.634) |
| *1st stage regression* | | | | | | | | | | | | |
| AREA_COLONY_A10 (log) | -0.037*** | -0.020*** | -0.037*** | -0.019*** | -0.034*** | -0.019*** | -0.037*** | -0.020*** | -0.034*** | -0.019*** | -0.030*** | -0.016*** |
| | (0.004) | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) | (0.004) | (0.005) | (0.005) | (0.004) | (0.006) | (0.005) |
| F-stat | 81.37 | 16.85 | 59.61 | 16.14 | 41.74 | 17.12 | 74.71 | 18.58 | 45.64 | 18.96 | 26.55 | 10.94 |
| Observations | 255 | 300 | 255 | 300 | 255 | 300 | 247 | 291 | 247 | 291 | 247 | 291 |
| R-squared | 0.974 | 0.963 | 0.974 | 0.963 | 0.974 | 0.963 | 0.977 | 0.969 | 0.976 | 0.969 | 0.976 | 0.968 |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year Dummies | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | ✓ | × | ✓ | × | ✓ | × | ✓ | × | ✓ | × | ✓ |

*Notes*: Regressions using democracy variables BCFH_A5 and BMF_F_A5 to be compared with columns 2 and 4 of Table 1 and Table 4. The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Controls are drawn from Hatton (2014, H14), see Appendix I Table AI.1. The grouping of regions follows the graphical breakdown used in Figure 1 showing the trends by European macro-region. Control group is the usual set of controls (PARENT_EDUC, PC_GDP, and IMO). European regions: Northern (Finland, Denmark, Norway, Great Britain, Ireland, and Sweden), Central (Austria, Belgium, Germany, France, and Netherlands), and Southern (Greece, Spain, Italy, and Portugal) Europe.

## III.B Huntington's "Waves of Democracy": Further Results

In section 7.2 of the paper we briefly examined differences in the effect of democracy during different 'waves'. Most of our sample captures the first wave, both in terms of time span and representativeness of the countries. For this purpose we use the BMR index as this matches the methodology used by Huntington (1991, 1993) to classify waves (both use the Dahl (1971) classification as operationalised in BMR13). The binary classification is reported in Table IIIB.1 shows all the shifts to democracy (green) and reversals (orange). The last column gives the periodisation of the Huntington waves. It illustrates that we capture mostly changes in Wave I, part of Wave II, and minimally Wave III.

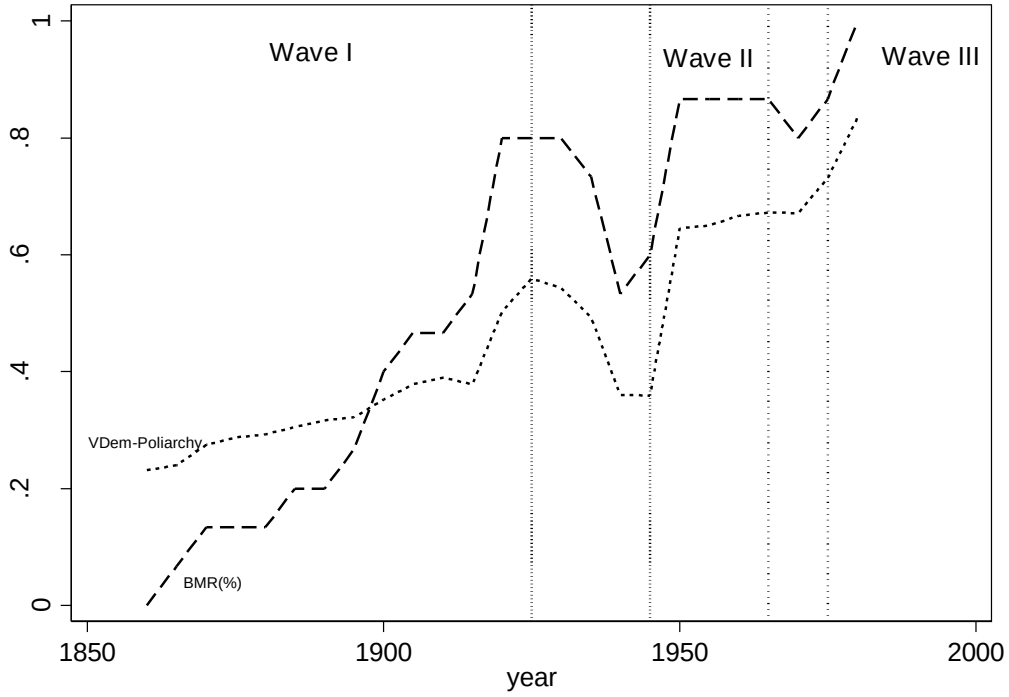
**Table IIIB.1. Switches in Democratic Status based on the BMR13 Index**

| iso3c | AUT | BEL | DEU | DNK | ESP | FRA | GBR | GRC | ITA | NLD | PRT | SWE | TOT | WAVE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1860 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** | |
| 1865 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** | |
| 1870 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | **2** | |
| 1875 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | **2** | |
| 1880 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | **2** | |
| 1885 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | **3** | |
| 1890 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | **3** | WAVE I |
| 1895 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | **4** | |
| 1900 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | **5** | |
| 1905 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | **6** | |
| 1910 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | **6** | |
| 1915 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | **7** | |
| 1920 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | **10** | |
| 1925 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | **9** | |
| 1930 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | **9** | |
| 1935 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | **8** | |
| 1940 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | **5** | |
| 1945 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | **6** | |
| 1950 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | **10** | |
| 1955 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | **10** | WAVE II |
| 1960 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | **10** | |
| 1965 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | **10** | |
| 1970 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | **9** | |
| 1975 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | **10** | WAVE III |
| 1980 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **12** | |

Source: BMR13 index of democracy—see Appendix I Table AI.1.

The Huntington classification is sensitive to the definition of democracy (Doorenspleet, 2000). For example, it has been noted, and can easily be verified, that waves almost disappear if the 100% of male enfranchisement (instead of 50%) and female enfranchisement are added to the definition of democracy. In spite of these limitations, it seems that historical record is in line with heterogeneous social differences in determining the 'type' of democratisation. Figure IIIB.1, shows the three Huntington waves for the 15 countries in our dataset using the democratic dummy from BMR13 (percentage of countries). Also shown in the figure is the mean of the electoral democracy (polyarchy) index scaled from zero to one from the V-Dem database discussed further below. Although the scaling differs between these two measures there is very strong correspondence between period-to-period movements.

**Figure IIIB.1. Illustration of Huntington Waves**




Source: For the BMR index see Appendix I Table AI.1; for the V-Dem Poliarchy Index see Section III.C below.

# III.C Evidence using the 'High-Level' Democracy Indices of the V-Dem (Varieties of Democracy) Database

## Table IIIC.1. Interpretation of V-Dem High-Level Indices

(Abstracted from pages 39-41 of the V-DemVersion9 Codebook)

*Electoral democracy index* (v2x_polyarchy). ELECTORAL

The electoral principle of democracy seeks to embody the core value of making rulers responsive to citizens, achieved through electoral competition for the electorate's approval under circumstances when suffrage is extensive; political and civil society organizations can operate freely; elections are clean and not marred by fraud or systematic irregularities; and elections affect the composition of the chief executive of the country. In between elections, there is freedom of expression and an independent media capable of presenting alternative views on matters of political relevance. In the V-Dem conceptual scheme, electoral democracy is understood as an essential element of any other conception of representative democracy — liberal, participatory, deliberative, egalitarian, or some other. Years: 1789-2018.

*Liberal democracy index* (v2x_libdem). LIBERAL

The liberal principle of democracy emphasises the importance of protecting individual and minority rights against the tyranny of the state and the tyranny of the majority. The liberal model takes a "negative" view of political power insofar as it judges the quality of democracy by the limits placed on government. This is achieved by constitutionally protected civil liberties, strong rule of law, an independent judiciary, and effective checks and balances that, together, limit the exercise of executive power. To make this a measure of liberal democracy, the index also takes the level of electoral democracy into account. Years: 1789-2018.

*Participatory democracy index* (v2x_partipdem). PARTICIPATORY

The participatory principle of democracy emphasises active participation by citizens in all political processes, electoral and non-electoral. It is motivated by uneasiness about a bedrock practice of electoral democracy: delegating authority to representatives. Thus, direct rule by citizens is preferred, wherever practicable. This model of democracy thus takes suffrage for granted, emphasising engagement in civil society organisations, direct democracy, and subnational elected bodies. To make it a measure of participatory democracy, the index also takes the level of electoral democracy into account. Years: 1789-2018.

*Deliberative democracy index* (v2x_delibdem). DELIBERATIVE

The deliberative principle of democracy focuses on the process by which decisions are reached in a polity. A deliberative process is one in which public reasoning focused on the common good motivates political decisions—as contrasted with emotional appeals, solidary attachments, parochial interests, or coercion. According to this principle, democracy requires more than an aggregation of existing preferences. There should also be respectful dialogue at all levels—from preference formation to final decision—among informed and competent participants who are open to persuasion. To make it a measure of not only the deliberative principle but also of democracy, the index also takes the level of electoral democracy into account. Years: 1900-2018.

*Egalitarian democracy index* (v2x_egaldem). EGALITARIAN

The egalitarian principle of democracy holds that material and immaterial inequalities inhibit the exercise of formal rights and liberties, and diminish the ability of citizens from all social groups to participate. Egalitarian democracy is achieved when (1) rights and freedoms of individuals are protected equally across all social groups; and (2) resources are distributed equally across all social groups; groups and individuals enjoy equal access to power. To make it a measure of egalitarian democracy, the index also takes the level of electoral democracy into account. Years: 1900-2018.

*Sources*:

Coppedge, M., Gerring, J., Knutsen, C. H., Lindberg, S. I. Teorell, J. et al. (2019), "V-Dem [Country-Year/Country-Date] Dataset v9", Varieties of Democracy (V-Dem) at: https://www.v-dem.net/en/data/data-version-9/.

Pemstein, D., Meserve, S. A., & Melton, J. (2010). Democratic compromise: A latent variable analysis of ten measures of regime type. *Political Analysis*, 18(4), 426-449.

The means of the five high-level V-Dem indices are reported for our sample in Table IIIC.2. Table IIIC.3 presents first and second stage coefficients for IV regressions of height on these democratic components. These are directly comparable to the 2WFE coefficients reported in the odd-numbered columns of panel A of Table 12. The first stage coefficients are highly significant and the second stage coefficients are larger than those obtained in 2WFE. In contrast to the results in Table 12 each of the components has a significant effect on height. Table IIIC.4 shows that similar results are obtained when controls are included. The IV coefficients are larger than the comparable 2WFE coefficients reported in the odd-numbered columns in panel B of Table 12, reflecting a downward bias in 2WFE, as noted when using other measures of democracy.
Furthermore, as noted in the text, both the 2WFE and the IV coefficients are larger than those for the other indices is partly because the scaling differs, as illustrated in Figure IIIA.1 above, and partly because this is a (0,1) continuous index rather than a dummy variable. Finally, Table IIIC.5 reports IV estimates including interactions with a post-WWII dummy (comparable to the even-numbered columns in Table12) but where only the main effect is instrumented. Of particular note is that the interaction with participatory democracy becomes significant, supporting the argument that expanding the franchise, especially to women, is important.

**Table IIIC.2. Descriptive Statistics from V-Dem v.9**

*Scale: Interval, from low to high (0-1)*

| Variable | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| ELECTORAL (*v2x_polyarchy)* | 292 | 0.49 | 0.27 | 0.04 | 0.92 |
| LIBERAL (*v2x_libdem)* | 290 | 0.44 | 0.25 | 0.01 | 0.88 |
| PARTICIPATORY (*v2x_partipdem)* | 292 | 0.32 | 0.20 | 0.01 | 0.72 |
| DELIBERATIVE (*v2x_delibdem)* | 210 | 0.46 | 0.26 | 0.01 | 0.89 |
| EGALITARIAN (*v2x_egaldem)* | 210 | 0.47 | 0.25 | 0.08 | 0.88 |

**Table IIIC.3. IV Regressions using V-Dem9 Democratic Components without Controls**

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| V-Dem Index | ELECTORAL | LIBERAL | PARTICIPATORY | DELIBERATIVE | EGALITARIAN |
| Democracy coefficient | 2.656*** | 3.133*** | 4.367*** | 3.158** | 3.751** |
| | (0.951) | (1.133) | (1.576) | (1.376) | (1.627) |
| Observations | 248 | 246 | 248 | 181 | 181 |
| R-squared | 0.974 | 0.973 | 0.973 | 0.971 | 0.970 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1st stage coef. | -0.016*** | -0.013*** | -0.009*** | -0.016*** | -0.014*** |
| | (0.003) | (0.002) | (0.002) | (0.004) | (0.003) |
| Min Eigenvalue | 49.25 | 44.77 | 34.30 | 36.30 | 34.90 |
| F-stat | 39.44 | 37.46 | 32.13 | 22.03 | 22.36 |
| Stock Yogo 10% Threshold | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin pval | 0.251 | 0.217 | 0.164 | 0.152 | 0.0686 |
| Hausman-Wu p-val. | 0.294 | 0.259 | 0.203 | 0.194 | 0.0987 |

*Notes:* Regressions using the five high-level indexes from the V-Dem dataset. The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are the democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH) and the dummies separately from BMR13 and Polity4. For more details on the construction of these variables, see Appendix I, AI3. For definitions and descriptive statistics of the indexes, see Tables IIIC.1 and IIIC.2.

## Table IIIC.4. IV Regressions using V-Dem9 Democratic Components with Controls

| (A) Second stage | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| V-Dem Democratic Dimension: | ELECTORAL | LIBERAL | PARTICIPATORY | DELIBERATIVE | EGALITARIAN |
| Democracy coef. | 2.746*** | 3.276*** | 4.606*** | 3.231** | 3.881** |
| | (1.029) | (1.218) | (1.723) | (1.351) | (1.637) |
| GDP_PC (Log) | -0.030 | -0.076 | -0.165 | 0.051 | 0.062 |
| | (0.506) | (0.512) | (0.529) | (0.569) | (0.585) |
| IMO | -0.086*** | -0.093*** | -0.104*** | -0.146** | -0.140** |
| | (0.029) | (0.029) | (0.030) | (0.063) | (0.065) |
| PARENT_EDUC | 0.004 | -0.005 | -0.054 | -0.067 | -0.104 |
| | (0.099) | (0.100) | (0.109) | (0.113) | (0.121) |
| Observations | 240 | 238 | 240 | 180 | 180 |
| R-squared | 0.975 | 0.974 | 0.974 | 0.973 | 0.971 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Min Eigenvalue | 44.47 | 40.36 | 31.27 | 39.97 | 37.81 |
| F-stat | 35.27 | 33.81 | 28.68 | 26.95 | 27.17 |
| Stock Yogo 10% threshold | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin p-val | 0.160 | 0.153 | 0.135 | 0.128 | 0.0494 |
| Hausman-Wu p-val | 0.202 | 0.195 | 0.175 | 0.173 | 0.0777 |
| (B) First stage | | | | | |
| Instrument | -0.016*** | -0.013*** | -0.009*** | -0.018*** | -0.015*** |
| | (0.003) | (0.002) | (0.002) | (0.003) | (0.003) |
| GDP_PC (Log) | 0.146** | 0.135** | 0.116*** | 0.194*** | 0.158*** |
| | (0.056) | (0.052) | (0.038) | (0.061) | (0.054) |
| IMO | 0.001 | 0.002 | 0.004 | 0.008 | 0.005 |
| | (0.004) | (0.004) | (0.003) | (0.007) | (0.006) |
| PARENT_EDUC | 0.032*** | 0.030*** | 0.032*** | 0.023* | 0.029** |
| | (0.011) | (0.010) | (0.008) | (0.012) | (0.011) |
| Observations | 240 | 238 | 240 | 180 | 180 |
| R-squared | 0.872 | 0.884 | 0.887 | 0.892 | 0.913 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ |

*Notes:* Regressions using the five high-level indexes from the V-Dem dataset. The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are the democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH) and the dummies separately from BMR13 and Polity4. For more details on the construction of these variables, see Appendix I, AI3. Controls are drawn from Hatton (2014, H14), see Appendix I, Table AI1. For definitions and descriptive statistics of the indexes, see Tables IIIC.1 and IIIC.2.

## Table IIIC.5. IV Regressions using V-Dem9 Democratic Indexes. Interaction with post WWII

| V-Dem-Index | ELECTORAL | LIBERAL | PARTICIPATORY | DELIBERATIVE | EGALITARIAN |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Democracy | 2.818*** | 3.232*** | 4.534*** | 3.531** | 4.262** |
| | (0.984) | (1.161) | (1.608) | (1.589) | (1.890) |
| Democracy x Post-WWII | 2.050 | 2.303 | 3.924** | 2.344 | 3.472 |
| | (1.266) | (1.490) | (1.940) | (1.973) | (2.262) |
| Observations | 248 | 246 | 248 | 181 | 181 |
| R-squared | 0.974 | 0.973 | 0.974 | 0.971 | 0.969 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | × | × | × | × | × |
| 1st stage coeff. | -0.017*** | -0.014*** | -0.010*** | -0.016*** | -0.014*** |
| | (0.003) | (0.002) | (0.002) | (0.004) | (0.003) |
| Min Eigenvalue | 47.52 | 45.35 | 35.07 | 31.49 | 31.24 |
| F-stat | 37.12 | 35.93 | 31.6 | 16.58 | 17.85 |
| Stock Yogo 10% threshold | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin p-val | 0.258 | 0.252 | 0.205 | 0.145 | 0.0693 |
| Hausman-Wu p-val | 0.302 | 0.297 | 0.248 | 0.189 | 0.101 |
| | (6) | (7) | (8) | (9) | (10) |
| Democracy | 2.836*** | 3.295*** | 4.639*** | 3.424** | 4.199** |
| | (1.038) | (1.223) | (1.715) | (1.474) | (1.817) |
| Democracy x PostWWII | 1.756 | 1.763 | 3.254* | 1.262 | 2.260 |
| | (1.228) | (1.419) | (1.815) | (1.880) | (2.125) |
| Observations | 240 | 238 | 240 | 180 | 180 |
| R-squared | 0.975 | 0.975 | 0.975 | 0.973 | 0.971 |
| Year FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Country FE | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ |
| 1st stage coef. | -0.016*** | -0.013*** | -0.009*** | -0.017*** | -0.014*** |
| | (0.003) | (0.002) | (0.002) | (0.004) | (0.003) |
| Min Eigenvalue | 43.86 | 41.54 | 32.93 | 35.28 | 34.17 |
| F-stat | 33.18 | 32.43 | 28.4 | 21.35 | 21.22 |
| Stock Yogo 10% threshold | 16.38 | 16.38 | 16.38 | 16.38 | 16.38 |
| Durbin p-val | 0.168 | 0.173 | 0.169 | 0.126 | 0.0492 |
| Hausman-Wu p-val | 0.212 | 0.219 | 0.213 | 0.172 | 0.0785 |

*Notes:* Regressions using the five high-level indexes from the V-Dem dataset. The dependent variable is a five-year average of adult male height in cm for 15 European countries from Hatton and Bray (2010, HB10). Note that these are aligned with year of birth not year when height was measured. Treatment variables are the democratic dummy generated by combining the information from Polity4 and BMR13 (BCFH) and the dummies separately from BMR13 and Polity4. For more details on the construction of these variables, see Appendix I, AI3. For definitions and descriptive statistics of the indexes, see Tables IIIC.1and IIIC.2 above.

## References for Appendix III

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