

Strieborny, Martin

Working Paper

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Working Paper, No. 2013:15

Provided in Cooperation with:

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Suggested Citation: Strieborny, Martin (2013) : Inequality and Growth: The Role of Beliefs and Culture, Working Paper, No. 2013:15, Lund University, School of Economics and Management, Department of Economics, Lund

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Department of Economics
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Inequality and Growth: The Role of Beliefs and Culture

Martin Strieborny

April 2013



LUND
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Inequality and Growth: The Role of Beliefs and Culture*

Martin Strieborny^{†‡}

First Draft: April, 2008
This Draft: February 1, 2013

Abstract

Governments perpetually align their policies to satisfy shifts in voters' relative demand for economic growth versus social equality. Following such shifts, increases (decreases) in government interventions lower (raise) both inequality and growth. This mechanism generates a positive co-movement between inequality and growth. The pattern is weaker in countries where a culturally determined belief that the rich are deserving renders equality a less important objective in the first place. I develop this analytical result in the theoretical framework of Alesina and Angeletos (2005), and I provide robust empirical support for it in a panel of 38 countries over the period 1964-2004.

Keywords: culture, inequality, growth

JEL classification: O15, O40, P16, Z1

*The most recent version of this paper can be downloaded from <http://works.bepress.com/strieborny/>. I would like to thank Jean Imbs, Marius Brülhart, Antonio Ciccone, Steven Durlauf, Reto Föllmi, Rafael Lalive, Andrei Levchenko, Florian Pelgrin, Martino Pelli, and Mathias Thoenig for very helpful comments and suggestions. I also benefited from discussions with the participants of the 15th World Congress of the International Economic Association in Istanbul, CEPR Conference "Economics of Culture, Institutions, and Crime" in Milan, 17th Silvaplan Workshop in Political Economy, Jerusalem Summer School in Economic Growth, Spring Meeting of Young Economists in Lille and Doctoral Workshop of West-Swiss Universities in Champex-Lac.

[†]Martin Strieborny highly appreciates the financial support from the Swiss National Fund.

[‡]University of Lund; *Contact:* Department of Economics, Lund University, Box 7082, 220 07 Lund, Sweden. E-Mail: Martin.Strieborny@nek.lu.se

1 Introduction

The question whether inequality promotes or hinders economic growth is among the most controversial ones in the field of growth and development. In the last 15 years, there has been a growing literature on the subject making use of ever more advanced econometric techniques, but a clear answer seems still elusive. This paper departs from this body of literature and stresses the role of beliefs and cultural factors in the inequality-growth nexus. Standard political economy models assume that a high inequality induces the median voter to support a distortionary redistribution with adverse consequences for growth. This mechanism is supposed to operate in the same way within all countries from Scandinavia to the United States. I examine whether the joint dynamics of inequality, redistribution, and growth within countries differ because of their different cultural background.

This paper claims that governments are adjusting the level of their interventions in the market economy (e.g., redistributive policies) in order to provide both economic growth and social equity demanded by voters. Crucially, the relative demand for these two public goods is not stable over time. In some periods, public focus is on economic growth, and hence liberalizing policies lead to an increase in both growth and inequality. In other periods, equality considerations dominate the political debate, and the resulting surge in regulation and redistribution leads to a decrease in inequality and a worsening of the economic performance. This pattern generates a positive co-movement between inequality and growth within countries over time.

The main point of this study is that the cultural background of countries affects the intensity of the pattern outlined above. The idea of altering the scope of government in order to regulate the level of inequality tends to prevail in egalitarian countries, which for cultural reasons consider inequality unfair. On the contrary, public support for such fine-tuning will be rather limited in laissez-faire countries, where the electorate views affluence as a deserved outcome of hard work. As a result, increases of government interventions should be more tightly associated with decreases of both inequality and growth within

egalitarian countries. The pattern should be less pronounced within laissez-faire countries, where the trade-off between social equity and economic growth is not the main driving force behind the dynamics of government interventions. Consequently, one would expect stronger positive co-movement of inequality and growth over time in culturally egalitarian countries.

To formalize this idea, I use the theoretical framework set out in Alesina and Angeletos (2005). In their model, people have a preference for social fairness captured by the notion that one should get what one deserves. Agents support rewarding individual skills and effort but oppose inequality that is based on pure luck. Such a preference for fairness can generate multiple steady states due to complementarity between prevailing beliefs and politico-economic outcomes. On the one hand, the US steady state (laissez-faire countries in the terminology of this paper) is characterized by less redistribution and a widespread belief that success in life is the result of hard work. On the other hand, agents operating in the EU steady state (i.e., the population of egalitarian countries) believe that luck determines success in life and therefore support a bigger economic role for the government.

Alesina and Angeletos (2005) focus on the steady state properties of the two equilibria, holding the preference for fairness constant. I introduce an exogenous shock to this preference and examine its economic implications in the egalitarian versus the laissez-faire regime. In egalitarian countries, an increased preference for fairness translates into a higher level of redistribution. In laissez-faire countries, the effect of this preference shock on the redistribution level displays in general a smaller magnitude and has an ambiguous sign. The intuition for this result is simple. In countries where people believe in the injustice of inequality, a positive shock to the preference for fairness transmits directly into a higher demand for redistribution. The same preference shock produces smaller increases or even decreases of government interference in the laissez-faire regime, in which social beliefs equate redistribution to the expropriation of hard-working rich people. In the model, more redistribution leads in turn to a lower inequality and a slower economic growth. The presence of shocks to the preference for fairness would therefore

also produce a stronger positive co-movement of inequality and growth within egalitarian countries compared to laissez-faire ones.

In the empirical part of the paper, I employ the data from the World Value Survey, a highly used and comprehensive database of social and economic beliefs. I focus on a question that asks the respondents whether success in life depends more on hard work or on luck and connections. One would expect that public demand for egalitarian outcomes is higher in countries where successful people are considered to be lucky rather than hard-working. Alesina and Angeletos (2005) - building on previous work by Alesina et al. (2001) - provide some cross-sectional empirical evidence for this conjecture. Both papers use the same WVS question and show that a stronger belief in luck as the main determinant of success is associated with a higher share of social spending in the GDP. In this paper, I utilize this social belief to empirically test whether the within-country dynamics of government intrusion, inequality, and growth differ between egalitarian and laissez-faire countries. I do so in three steps.

First, I tackle the endogeneity issue concerning such surveys. The expressed beliefs reflect both the deep cultural attitudes and the feedback from the real economy. I use the shares of various religious denominations in the population to extract the culturally driven part of economic beliefs in a given country. Religious composition serves here as a proxy for a broader notion of cultural differences across countries. I use the obtained value of culturally determined component of people's attitudes toward social equity to divide the countries into egalitarian and laissez-faire societies.

Second, I present some evidence that the dynamic link between government interventions and either inequality or growth is not equally strong across the two country groups. The changes in inequality and the changes in government interventions are negatively correlated both within laissez-faire and egalitarian countries. The correlation is, however, stronger in the egalitarian group. The difference between mean correlations of the two country groups is both quantitatively important and statistically significant. The correlation of changes in government interventions and economic growth is not significant within laissez-faire countries, but it is negative within egalitarian ones.

Finally, I test whether the above mechanism translates into a stronger positive co-movement of inequality and growth within egalitarian countries than within laissez-faire countries. Various panel data estimation techniques capturing the within-country dynamics over time (the fixed effects, the system GMM, and the bias-corrected Least-Square Dummy Variable - LSDVC) confirm that the coefficient of inequality in growth regressions is indeed significantly higher in egalitarian countries.

These results contribute to two strands of the literature.

First, the results indicate that culture might play an important role in the complex relationship between inequality and growth. This contributes to the empirical work that tries to identify the causal effects of income distribution on economic performance. The renewed interest in this question started with the seminal contributions of Alesina and Rodrik (1994) and Persson and Tabellini (1994), who provided empirical evidence for a negative effect. The subsequent cross-sectional studies confirmed this result, but the later use of panel data estimation challenged the emerging consensus. Both Li and Zou (1998), applying the standard fixed effects estimation, and Forbes (2000), using the difference GMM approach, found a positive and significant relationship between inequality and growth in the short and medium term.¹ Empirical evidence has remained inconclusive since. Estimations relying on cross-section estimations mostly find negative coefficient estimates, while methods focusing on the time-series component of variations (fixed effects, GMM estimation) tend to report a positive link. The longer the chosen growth period, the lower the coefficient of the inequality measure in growth regressions.² Given this diverse and sometimes contradictory evidence, subsequent papers applied various and increasingly advanced econometric techniques and tried to identify the possible nonlinearities in the inequality-growth nexus. Barro (2000) uses random effects and 3SLS estimator and argues that the link is positive for rich countries and negative for poor ones. Banerjee and Duflo (2003) employ kernel estimation and suggest that both positive and negative changes in inequality are associated with a lower economic growth.

¹Even if this is not necessarily at odds with the cross-sectional evidence of a negative link in the long run. For details see Forbes (2000).

²De Dominicis et al. (2006) provide an overview of this growing literature.

Voitchovsky (2005) applies the system GMM estimator and finds evidence for a positive (negative) effect of inequality at the top (bottom) end of the income distribution. This paper offers a fundamentally different explanation relying on deep cultural characteristics of countries. The presented results indicate that cultural factors could be an important driving force behind the observed evolution of inequality and growth. To my knowledge, this possibility has not been examined so far.

Second, the paper contributes to the emerging field of cultural economics. The idea that culture matters for economic outcomes has attracted a lot of attention in recent years. The interested reader can turn to Tabellini (2007) and Fernandez (2007) for an excellent analysis of the current state and future perspectives in this promising research program. So far, empirical work in this area focused on cross-sectional variation across countries or regions. In this literature, the economic significance of cultural factors shows up in the different long-run economic outcomes across culturally diverse geographical units. This paper raises the possibility that the cultural background can also affect the joint evolution of economic variables within countries over time. This result might be seen as a complement to the existing cross-sectional evidence on the link between culture and long-term economic outcomes.

The remainder of the paper is organized as follows: The next section builds upon the theoretical work of Alesina and Angeletos (2005) and shows how variation in the strength of the preference for fairness can generate the patterns outlined above. Sections 3, 4, and 5 constitute the empirical part of the paper. Section 3 describes the data. Section 4 lays out the econometric methodology, and Section 5 presents the empirical results. Section 6 concludes.

2 Theoretical Framework

2.1 Model of Alesina and Angeletos (2005)

Alesina and Angeletos (2005) study a non-overlapping-generations model. Each generation consists of a continuum of agents, indexed by $i \in [0, 1]$, who live for one period. The pre-tax wealth of an agent from dynasty i and generation t is given by:

$$y_{it} = A_{it}e_{it} + \eta_{it} + k_{it-1}, \quad (1)$$

where A_{it} denotes innate talent, e_{it} effort, η_{it} luck, and k_{it-1} the bequest (or more generally parental investment) of the previous generation. The agent's budget constraint writes:

$$\begin{aligned} c_{it} + k_{it} &= w_{it} \equiv (1 - \tau_t)y_{it} + G_t \\ \text{with } G_t &= \tau_t \bar{y}_t \text{ and } \bar{y}_t = \int_i y_{it} di, \end{aligned} \quad (2)$$

where c_{it} denotes consumption, k_{it} is the bequest left to the next generation, w_{it} represents the disposable wealth, τ_t is the tax rate, G_t denotes lump-sum transfers, and \bar{y}_t represents the mean income in generation t . Individual preferences reflect both selfish motives and an altruistic desire for a fair social outcome:

$$U_{it} = u_{it} - \gamma \Omega_t, \quad (3)$$

with u_{it} denoting the private utility, Ω_t representing the aggregate social injustice, and parameter γ capturing the preference for fairness. Private utility is derived from individual choices of consumption c_{it} , parental investment k_{it} , and effort e_{it} :

$$u_{it} = V_{it}(c_{it}, k_{it}, e_{it}) = \frac{1}{(1 - \alpha)^{1-\alpha} \alpha^\alpha} (c_{it})^{1-\alpha} (k_{it})^\alpha - \frac{1}{2\beta_{it}} (e_{it})^2,$$

with β_{it} measuring the willingness to work and the constant $\frac{1}{(1-\alpha)^{1-\alpha} \alpha^\alpha}$ being a convenient normalization.

The overall social injustice Ω_t measures the aggregate difference between the actual level of utility u_{it} and the fair level of utility \widehat{u}_{it} across all dynasties of agents:

$$\Omega_t = \int_i (u_{it} - \widehat{u}_{it})^2. \quad (4)$$

The fair level of utility \widehat{u}_{it} is the portion of utility achieved due to talent and effort rather than luck or government transfers:

$$\widehat{u}_{it} = V_{it}(\widehat{c}_{it}, \widehat{k}_{it}, e_{it}),$$

where \widehat{c}_{it} and \widehat{k}_{it} denote the fair (luck-free) levels of consumption and parental investment defined below.

Heterogeneity in the population is thus characterized by the distribution of $(A_{it}, \beta_{it}, \eta_{it})$. Following Alesina and Angeletos (2005), let us for simplicity define $\delta_{it} \equiv (A_{it})^2 \beta_{it}$, $\sigma_\delta^2 \equiv Var(\delta_i)$, $\sigma_\eta^2 \equiv Var(\eta_i)$, and $\Delta \equiv \bar{\delta} - \delta_m$, with $\bar{\delta}$ and δ_m denoting the mean and median of δ_i , respectively. Parameters δ_{it} and η_{it} are i.i.d. across agents but fully persistent over time. Further assumptions include $Cov(\delta_i, \eta_i) = 0$, and zero mean and median for η_{it} . The economy is thus parametrized by $E \equiv (\Delta, \gamma, \alpha, \sigma_\delta^2, \sigma_\eta^2)$. The parameters Δ and γ capture the two sources of support for redistribution: the traditional selfish motive arising if the median voter is poorer than the average ($\Delta > 0$) and the altruistic motive originating in the desire for fairness ($\gamma > 0$).

The optimizing agents choose consumption, effort, and parental investment (c_{it}, e_{it}, k_{it}) to maximize the utility subject to their individual budget constraint while taking the aggregate outcomes (Ω_t, τ_t, G_t) as given. Due to the Cobb-Douglas functional form of private utility, the resulting optimal levels of consumption and parental investment become:

$$c_{it} = (1 - \alpha)w_{it} \text{ and } k_{it} = \alpha w_{it}.$$

Accordingly, the utility of household i in generation t amounts to $u_{it} = w_{it} - \frac{1}{2\beta_{it}}(e_{it})^2$,

implying the following optimal level of effort:

$$e_{it} = (1 - \tau_t)A_{it}\beta_{it}.$$

Given these outcomes of individual optimization, one can define the fair levels of consumption and parental investment. Intuitively, those are the levels that would be achieved in the absence of pure luck η_{it} and social transfers. Formally:

$$\begin{aligned}\widehat{c}_{it} &= (1 - \alpha)\widehat{y}_{it} \text{ and } \widehat{k}_{it} = \alpha\widehat{y}_{it} \\ \widehat{w}_{it} &= \widehat{y}_{it} = A_{it}e_{it} + \widehat{k}_{it-1}.\end{aligned}$$

Iterating the latter expression backwards yields the fair level of wealth, which reflects the cumulative effect of talent A_{it} and effort e_{it} over the whole history of dynasty i :

$$\widehat{w}_{it} = \widehat{y}_{it} = \sum_{s \leq t} \alpha^{s-t} A_s^i e_s^i. \quad (5)$$

Analogously, the difference between actual and fair wealth $w_{it} - \widehat{w}_{it}$ represents the overall effect of luck and redistribution on the wealth accumulated by the dynasty. Furthermore, because of quasi-linearity of private utility in wealth, $u_{it} - \widehat{u}_{it} = w_{it} - \widehat{w}_{it}$ for every i . This implies that aggregate social injustice $\Omega_t = \int_i (u_{it} - \widehat{u}_{it})^2$ reduces to:

$$\Omega_t = Var(w_{it} - \widehat{w}_{it}).$$

Alesina and Angeletos (2005) show in the technical appendix to their paper that, for a given stationary history of taxation ($\tau_s = \tau$ for all previous generations $s \leq t - 1$), the private utility of the median voter is given by:

$$u_{mt} = -\frac{1}{2}\tau_t^2 + \tau_t \left[(1 - \tau_t) + \frac{\alpha(1 - \tau)^2}{1 - \alpha(1 - \tau)} \right] \Delta,$$

and the overall level of social injustice is:

$$\Omega_t = [(1 - \tau_t)\tau_t - \frac{\alpha(1 - \tau)^2}{1 - \alpha(1 - \tau)}(1 - \tau_t) + \frac{\alpha(1 - \tau)}{1 - \alpha}]^2 \sigma_\delta^2 + (1 - \tau_t)^2 [1 + \frac{\alpha(1 - \tau)}{1 - \alpha(1 - \tau)}]^2 \sigma_\eta^2.$$

Under the assumption that the government chooses the tax rate τ_t in order to maximize the welfare of the median agent, the optimal tax rate for the current generation is $\tau' = \phi(\tau; E)$ with:

$$\begin{aligned} \phi(\tau; E) \equiv & \arg \min_{\tau_t \in [0,1]} \left\{ \frac{1}{2} \tau_t^2 - \tau_t [(1 - \tau_t) + B] \Delta \right. \\ & \left. + \gamma [(1 - \tau_t)(\tau_t - B) + A]^2 \sigma_\delta^2 \right. \\ & \left. + \gamma (1 - \tau_t)^2 [1 + A]^2 \sigma_\eta^2 \right\}, \end{aligned} \quad (6)$$

where $A = \frac{\alpha(1 - \tau)}{1 - \alpha(1 - \tau)} > 0$ and $B = \frac{\alpha(1 - \tau)^2}{1 - \alpha(1 - \tau)} > 0$.

The optimal tax rate is thus increasing in the difference between the average and the median agent (Δ), reflecting the standard selfish motive for redistribution.³ If the preference for fairness is present ($\gamma > 0$), the optimal tax rate depends also on the sources of income inequality (σ_δ^2 versus σ_η^2). Alesina and Angeletos focus on the fact that multiple steady states emerge in an environment with the preference for fairness. They identify two stable equilibria and call them US and EU. The US steady state is characterized by a lower taxation, fewer distortions (and thus higher output), a higher inequality, and fairer outcomes (represented by a higher ratio $\frac{\text{Var}(\hat{y}_{it})}{\text{Var}(y_{it} - \hat{y}_{it})}$) than the EU steady state. Throughout their analysis, the authors hold all the parameters, including the strength of the fairness preference (γ), constant.

³Note that both the mean and the median of luck η equal zero, so that the difference between the average and the median voter originates solely in the heterogeneity of skills and work ethos captured by $\Delta \equiv \bar{\delta} - \delta_m$.

2.2 Shocks to the Preference for Fairness γ

For the purpose of this paper, I am interested in how a small change in the preference for fairness (γ) affects the level of redistribution in countries with different sources of income heterogeneity (σ_δ^2 versus σ_η^2). Technically, I introduce an exogenous shock to γ , which occurs in the steady state, and ask whether the relative importance of pure luck (σ_η^2) versus skills and work ethos (σ_δ^2) matters for the sign and the magnitude of the derivative $\frac{\partial \tau_t}{\partial \gamma}$. This subsection thus deviates from the symmetric treatment of the exogenous variables in the model, in particular regarding the parameters γ , σ_δ^2 , and σ_η^2 .

The contributions of luck (σ_η^2) versus efforts and skills (σ_δ^2) to the income heterogeneity might well have uniform values derived from the distribution of skills and character traits (e.g., laziness) in the human population. However, as argued in a more detail in the empirical part (Subsection 4.1), it is unrealistic to assume that agents fully observe the true values of σ_δ^2 and σ_η^2 . More plausibly, a belief whether the world is a fair place (σ_δ^2 high relative to σ_η^2) is a persistent variable dependent on cultural and ideological biases in a given country. I therefore assume that σ_δ^2 and σ_η^2 are stable over time but different across countries.

By contrast, parameter γ is not culturally determined. It rather captures a deep human need for fairness. I assume that γ does not vary systematically across countries, as there is little reason to think that people in some countries are intrinsically more selfish than in others. However, γ is not perfectly stable over time, as humans are more selfish in some periods and less in others. For example, a median agent suffering from an adverse income shock could start to care more about herself than about a general notion of fairness in society. Like in a football match, the decision how fair to play (γ) is more prone to temporary shocks than the perceived rules of game (σ_δ^2 and σ_η^2).

When demanding a given level of redistribution, the median agent has both selfish (Δ) and altruistic motives (γ). Allowing for fluctuations in peoples' desire to bring more fairness into the world has therefore consequences for the dynamics of redistribution. Crucially, the effect of a shock to the preference for fairness will depend on how unfair

the median agent perceives the existing inequality in society to be in the first place. On the one side, the inequality originating in the heterogeneity of skills (A_i) and work ethos (β_i) - as captured by (σ_δ^2) - is considered to be fair. On the other side, the inequality generated by different luck of agents - captured by (σ_η^2) - is seen as undeserved. The values of σ_δ^2 and σ_η^2 should thus have an impact on the value or even the sign of the derivative $\frac{\partial \tau_t}{\partial \gamma}$.

The general notions of what constitutes an unfair source of income heterogeneity are the same across countries. However, agents in different countries will observe different values for σ_δ^2 and σ_η^2 , with implications for the derivative $\frac{\partial \tau_t}{\partial \gamma}$. In every country, the benevolent government chooses the optimal current tax τ_t , taking the history of taxation τ as given. Computing the first order condition from (6) yields:

$$\begin{aligned} 0 &= \tau_t - [(1 - \tau_t) + B]\Delta + \tau_t \Delta \\ &+ 2\gamma[(1 - \tau_t)(\tau_t - B) + A][1 - 2\tau_t + B]\sigma_\delta^2 \\ &- 2\gamma(1 - \tau_t)[1 + A]^2\sigma_\eta^2. \end{aligned}$$

The application of the implicit function theorem then reveals the effect of a small change in the preference for fairness (γ) on the optimal level of redistribution. To make the point clear, I focus on the extreme cases when observed inequality arises only due to heterogeneity of luck ($\sigma_\delta^2 = 0$) or originates exclusively in different skills and work ethos ($\sigma_\eta^2 = 0$):⁴

$$\begin{aligned} \sigma_\delta^2 &= 0 : \\ \frac{\partial \tau_t}{\partial \gamma} &= \frac{(1 - \tau_t)[1 + A]^2\sigma_\eta^2}{\frac{1}{2} + \Delta + \gamma[1 + A]^2\sigma_\eta^2} > 0 \end{aligned} \tag{7}$$

⁴The general expression for the derivative $\frac{\partial \tau_t}{\partial \gamma}$ writes:

$$\frac{2(1 - \tau_t)[1 + A]^2\sigma_\eta^2 - 2[(1 - \tau_t)\tau_t - B(1 - \tau_t) + \frac{\alpha(1 - \tau_t)}{1 - \alpha}][1 - 2\tau_t + B]\sigma_\delta^2}{1 + 2\Delta + 2\gamma[1 + A]^2\sigma_\eta^2 + 2\gamma\{[1 - 2\tau_t + B]^2 - 2[(1 - \tau_t)\tau_t - B(1 - \tau_t) + \frac{\alpha(1 - \tau_t)}{1 - \alpha}]\}\sigma_\delta^2}$$

$$\begin{aligned}\sigma_\eta^2 &= 0 : \\ \frac{\partial \tau_t}{\partial \gamma} &= -\frac{[(1 - \tau_t)(\tau_t - B) + A][1 - 2\tau_t + B]\sigma_\delta^2}{\frac{1}{2} + \Delta + \gamma\{[1 - 2\tau_t + B]^2 - 2[(1 - \tau_t)(\tau_t - B) + A]\}\sigma_\delta^2}.\end{aligned}\quad (8)$$

In this paper's terminology, the first case describes egalitarian countries and the second relates to laissez-faire countries. The expressions are rather complicated, but one can identify several patterns. If the inequality is due to pure luck, an increase in the preference for fairness leads unambiguously to a higher redistribution. If different skills and work ethos are the sources of different income, then the sign of $\frac{\partial \tau_t}{\partial \gamma}$ is ambiguous.

Another matter of interest concerns the magnitude of the effect. One additional assumption is needed for a meaningful analysis of this issue. The preference for fairness (γ) has to be relatively small compared to the selfish motive for redistribution captured by $\frac{1}{2} + \Delta$. This assures that the denominator in (8) remains positive and does not get close to zero. Without this additional assumption, a small change in the parameters could lead to switching of $\frac{\partial \tau_t}{\partial \gamma}$ between zero, infinity, and minus infinity.⁵

Even if the denominator in (8) is positive, the sign of the numerator, and hence of the whole expression, remains ambiguous in the case of laissez-faire countries. Numerical simulations show that a lower level of redistribution and a higher share of wealth allocated to parental investment (α) are associated with a negative $\frac{\partial \tau_t}{\partial \gamma}$ in countries where luck does not affect the income distribution ($\sigma_\eta^2 = 0$). Additionally, the absolute magnitude of $\frac{\partial \tau_t}{\partial \gamma}$ is smaller in laissez-faire countries. This holds true when parameters other than σ_δ^2 and σ_η^2 are equal for both countries' groups and also if one allows for a reasonably higher level of redistribution in egalitarian countries.

In general, a preference shock thus has a smaller impact on redistribution in countries where agents observe fair origins of inequality. Note that this different dynamics does *not* stem from a different preference for fairness (γ). The median agent in a laissez-faire

⁵To stress the point, let us assume that the median voter does not care about her private utility at all, so that the first line in (6) would be equal to zero. Thus, the choice of the optimal tax rate would be driven entirely by fairness considerations captured by the parameter γ . Small changes in the preference for fairness could then easily translate into immense changes of the tax rate set by the benevolent government. The presence of a sufficiently strong selfish motivation thus prevents the tax rate from being implausibly sensitive to small fluctuations in the preference for fairness.

country is no more selfish than the median agent in an egalitarian country. It is rather the different perception of the sources of income heterogeneity that provides the intuition for this analytical result.

If the inequality originates in differing skills and work ethos, the median voter faces a trade-off between her selfish interest (Δ) and her desire for social justice (γ). Redistribution increases her private utility by transferring wealth from the average agent. At the same time, such redistribution expropriates hard working agents with better skills and hence makes the income distribution less fair. An increase in γ , while holding Δ constant, would then generate a decline in the redistribution of wealth originating in labour income. However, the accumulated wealth of dynasties reflects also redistributions that occurred in the past (τ). The undeserved component of current wealth due to those past redistributions rationalizes further redistribution after an increase in the fairness preference γ . This offsetting effect explains why, in laissez-faire countries with no luck heterogeneity, the derivative $\frac{\partial \tau_t}{\partial \gamma}$ has an ambiguous sign and a smaller magnitude than in the countries characterized by inequality due to luck.

If the inequality arises from pure luck, redistribution makes the income distribution more fair by tempering the income heterogeneity stemming from an unfair source. In egalitarian countries, the increase in the preference for fairness (positive shock to γ) thus induces the median agent to demand more, rather than less, redistribution of labour income. Crucially, the undeserved component of dynasties' wealth due to past redistributions has now a reinforcing, rather than offsetting, effect on the derivative $\frac{\partial \tau_t}{\partial \gamma}$. The absence of "fair heterogeneity" ($\sigma_\delta^2 = 0$) and the presence of past redistributions go namely in the same direction, yielding an unambiguously positive and relatively large value of $\frac{\partial \tau_t}{\partial \gamma}$.

To sum up, introducing an exogenous shock to the preference for fairness (γ) into the theoretical framework of Alesina and Angeletos (2005) has different implications in the laissez-faire and egalitarian regimes. In egalitarian countries, a positive shock to the fairness preference leads to an unambiguous increase in the redistribution level. In the case of laissez-faire countries, the sign of the effect is ambiguous and its absolute

magnitude is smaller.

Egalitarian countries are thus characterized by a clear-cut connection between preference shocks and dynamics of redistribution. The changes in the level of government interventions are there, to a large extent, driven by shifts in the public focus between fairness and economic performance. The situation will be different in *laissez-faire* countries, with a loose and ambiguous link between preference shocks and fluctuations in the level of redistribution. There, the dynamics of government interventions will be dominated by the allocative and stabilization roles of the state (outside the scope of the presented model) rather than by equity considerations. This has consequences for the inequality-growth dynamics within countries as fluctuations in government interventions lead to fluctuations in both inequality and economic growth. In egalitarian countries, with a tight link between preference shocks and changes in redistribution, the joint dynamics of government interventions, inequality, and growth will be driven to a large extent by the mechanism derived in this paper. In *laissez-faire* countries, with a loose and ambiguous link between preferences and redistribution, the joint dynamics of interventions, inequality, and growth will be loose as well.

What would one expect this joint dynamics - stronger in egalitarian countries, weaker in *laissez-faire* ones - to be? In the model, increases in the redistribution level lead to decreases in both inequality and economic growth (see Appendix A). Empirically, one should then observe within egalitarian countries a stronger negative co-movement of redistribution and inequality as well as a stronger negative co-movement of redistribution and growth. This would imply a stronger positive co-movement of inequality and growth in those countries. Intuitively, countries that consider both inequality and growth as legitimate policy objectives will also observe a tighter link between the two. The described pattern of co-movements between government interventions, inequality, and growth will be less pronounced in countries where people see income inequality as a consequence of different skills and work ethos.

An interesting direction for future research would be to formally derive the above empirical implications. This would involve moving beyond the model of Alesina and

Angeletos (2005) and incorporating fluctuations of government interventions justified by allocative and stabilization (rather than egalitarian) roles of the state. Such a theoretical project goes beyond the scope of this paper. Here the extension of the theoretical framework by Alesina and Angeletos serves mainly to motivate the following empirical sections that constitute the main part of the paper.

3 Data

From the data point of view, the crucial task is to find a suitable proxy for measuring how people in different countries perceive the fairness of income heterogeneity. I use the data from the World Value Survey (WVS), which represents probably the most comprehensive database of social and economic beliefs. The WVS has recently become a widely used source in empirical literature on the role of beliefs for economic outcomes (Alesina et al. 2001, Guiso et al. 2003). I have chosen to focus on the question about the main determinant of success in life. In a representative opinion poll, the respondents in each country were confronted with two conflicting statements: "In the long run, hard work usually brings a better life" and "Hard work doesn't generally bring success - it's more a matter of luck and connections". They could choose 1 (meaning complete agreement with the first statement), 10 (complete agreement with the second statement), or any number in between. In terms of the theoretical motivation, a high value for the average response in a country implies a large (perceived) contribution of luck to the overall income heterogeneity. More formally, it corresponds to a high $\frac{\sigma_\eta^2}{\sigma_\delta^2}$ ratio. I take the average response from the second and the third wave of the WVS, when this question was asked.

The answer to the above question seems determined mostly by deeper cultural convictions. Yet it still provides a good proxy for the public beliefs regarding the fairness of income differences. The more widespread the belief that economic success originates in luck rather than in hard work, the more public support for a governmental provision of social equity can be expected.

The choice of a proper proxy for economic beliefs is not innocuous, especially if some

authors work with questions comparing the actual and the desirable state of affairs. One example is the question from the WVS asking the respondents whether incomes should be made more equal or the country needs larger income differences as incentives. The response yields arguably a better proxy for the attitudes toward the redistributive role of the state and was used, e.g., by Guiso et al. (2003). However, the endogeneity problem now becomes striking: e.g., in the third wave of the WVS (performed in years 95/96), the average response in Sweden was more "pro-free-market" than in Australia or even in the United States. It is hard to believe that this result does not reflect the attitude of the Swedes to the existing scope of their welfare state rather than their low support for more egalitarian outcomes in general. To be clear, Guiso et al. (2003) look at individual data while controlling for country fixed effects. With this difference-in-difference approach, the presented problem is less of an issue. However, here I look at the average response in countries, hence choosing such a proxy for beliefs would be problematic. The question about the source of personal success used in this paper minimizes this kind of concern, as it is an absolute and not a relative measure. In particular, it asks about personal convictions in general and does not involve comparisons between the existing and the desirable.

Equally important is to find a proper measure of inequality within countries. Until very recently, the majority of the papers in the field used the inequality dataset compiled by Deininger and Squire (1996). This source represented a huge improvement in terms of coverage and data quality and hence allowed for the first time the use of panel estimation in the inequality-growth context. However, Atkinson and Brandolini (2001) brought forward serious criticism regarding the comparability of those data across countries and over time. I rely therefore on the University of Texas Inequality Project (UTIP) dataset recently created by James K. Galbraith and associates.⁶ In particular, I use their Estimated Household Income Inequality (EHII) dataset, which exploits the econometric

⁶ Another source of inequality data considered to be superior to the Deininger-Squire dataset in terms of data quality and comparability is the Luxembourg Income Study dataset used, e.g., by Voitchovsky (2005). However, this database focuses mostly on the developed OECD countries, so the improved data quality comes at the cost of significantly reducing the sample size.

relationship between UTIP-UNIDO data on industrial pay inequality and the extended Deininger-Squire dataset while accounting for different types of data sources (income versus expenditure, household versus per capita, gross versus net).⁷ This approach yields a consistent measure of inequality that allows for a better comparability across space and over time.

The measure for government interventions comes from the Government Size Index by the Fraser Institute and captures government consumption, transfers and subsidies, government enterprises and investment, and top marginal tax rates.⁸

The remaining variables come from the standard sources. Output (GDP) and investment share in output are from the Penn World Table and educational attainment from the Barro-Lee dataset. The religious data come from the Religion Adherence Data Set by Robert Barro and comprise the percentage of population belonging to five most important religious denominations in our country sample - Catholics, Protestants, other Christians (e.g. Evangelicals), Eastern religions (comprising Taoism and Confucianism among others), and Hinduists/Buddhists. All religious shares are measured in 1970 and thus precede the recent immigration surges driven by globalization and economic integration. These immigration waves could affect religious composition in the recipient countries and at the same time be correlated with changing economic conditions during the sample period, violating the validity of the IV estimation.

The main data constraint is the number of countries where the WVS researchers asked the question about luck versus hard work as determinants of success in life. Following the usual practice in growth regressions, I do not include countries that were in the past a part of the Soviet political and economic block. This leaves 42 non-transition countries from the WVS sample. Data availability from other sources then allows me to construct a final 5-year panel dataset for 38 countries over the period 1964-2004.

⁷For the dataset and further details on methodology see <http://utip.gov.utexas.edu>

⁸The original Government Size Index measures the magnitude of economic freedom with higher values of index standing for less interventions of the government in economy. I rescaled the index, so that in this paper higher index values represent a higher level of the government interventions.

4 Econometric Methodology

4.1 Luck, Skills, and Cultural Background of Countries

In the theoretical framework of Alesina and Angeletos (2005), agents perfectly observe the relative contributions of luck (σ_η^2) versus effort and skills (σ_δ^2) to the income heterogeneity. This full information about the aggregate level of social injustice is surely a simplification, as the authors themselves readily admit (Alesina and Angeletos 2005, p. 974f.). The public perceptions of reality often differ from the reality itself. And these perceptions, rather than the truth, are decisive from the political-economy point of view. It does not matter whether rich people are hard-working agents who do not owe a single cent of their wealth to pure luck ($\sigma_\eta^2 = 0$). As long as the public *believes* that the inequality in their country has nothing to do with differences in effort or skills ($\sigma_\delta^2 = 0$), it will expect from the government both economic growth and social equity. The best empirical proxy for an egalitarian country in this framework is thus not the true (and mostly unobservable) dominance of luck over hard work in generating inequality but the public belief that such dominance prevails.

The standard proxies for public beliefs come from representative surveys, like the one used in this paper and described in the data section. The problem is that the developments in the real economy could affect the responses in such surveys. This might pose some endogeneity problems in examining whether different beliefs lead to different dynamics of government interventions, inequality, and growth. Fortunately, beliefs about the determinants of success in life are also shaped by the culture and the historical experience of a given country. A typical example is the strong belief among the US population in an exceptional social mobility within their country. Benabou and Tirole (2006, p. 702f.) cite several papers providing empirical evidence that the true intergenerational income and education mobility in the United States is not significantly higher than in other developed countries. Contrary to the "American Dream" perception, several European countries are nowadays more socially mobile than the United States. This example suggests a culturally determined component of public beliefs that is subject to strong

hysteresis effects and can be widely immune to developments in the real economy.

Applied in the context of this paper, a deeply rooted cultural background shapes long-standing popular beliefs that in turn determine the egalitarian or laissez-faire character of a country. Religion is a natural choice if one wants to identify the part of beliefs that is culturally determined and therefore exogenous to the contemporaneous economic situation in the country. Previous work (Guiso et al. 2003, 2006) already established a significant link between religion and economic beliefs at the individual level. The focus here is on the relationship at the aggregate level: how the cultural environment shapes the economic beliefs of the representative agent in a given country. I therefore look at the religious composition of the population, which stands for a broader notion of countries' cultural background. In particular, I regress the average survey response in a given country on the shares of various religious denominations in the population:

$$Beliefs_c = \alpha + \beta ReligionShares_c + u_c, \tag{9}$$

with subscript c denoting country. I deploy the estimated coefficients from this cross-sectional regression to isolate the culturally determined component of people's beliefs about magnitude of unfair income heterogeneity in a given country ($\widehat{Beliefs}_c = \widehat{\alpha} + \widehat{\beta} ReligionShares_c$). The value of $\widehat{Beliefs}_c$ can distinguish between societies whose cultural background favours laissez-faire attitudes and societies that culturally tend to more egalitarian views.

First, I use this value and construct a dummy variable that divides the countries into equally large groups of egalitarian and laissez-faire societies. I examine whether there is indeed a stronger negative co-movement between government interventions and inequality, as well as between government interventions and growth, within the egalitarian group of countries. This would provide empirical evidence for the theoretical mechanism of this paper.

Second, I explore whether the culturally determined part of peoples' beliefs matters also in the reduced form relationship between inequality and growth within countries.

On that account, I take both the continuous value of $\widehat{Beliefs}_c$ and the dummy variable based on it, and I use them as alternate measures of culture in the growth regressions described in the following subsection.

4.2 Culture, Growth, and Inequality

Given the focus on the inequality-growth dynamics *within* countries, I rely on the panel data regressions that control for country fixed effects. There are at least two other reasons for using the within-country estimation techniques. First, the bulk of recent empirical growth literature seems to agree that controlling for the omitted country-specific effects is crucial in the context of growth econometrics. The majority of panel data growth studies therefore rely on within-group estimation rather than on random effects estimation (Durlauf et al. 2005, p. 629). This applies to the studies looking at the effects of inequality on economic growth as well. Second, since Forbes (2000), most of the controversy in the literature on the growth-inequality nexus is associated with fixed effects panel data studies.

The empirical model is represented by the following dynamic specification that controls for fixed effects and has become standard in recent growth literature:

$$y_{ct} = \alpha y_{ct-1} + \beta X_{ct} + n_c + h_t + v_{ct}, \quad (10)$$

where y represents the level of output, X is a vector of regressors, h_t are the time dummies, n_c capture the unobserved country-specific effects, and v_{ct} is the error term. The subscripts c and t denote country and time, respectively. The length of the time period in the panel data structure is five years, as usual in the literature. This relatively low frequency should eliminate short-run business fluctuations and is also motivated by data availability. In order to examine the interactions between the cultural background of a country and its internal growth-inequality dynamics, one has to narrow down the general formulation in (10).

In particular, the performed regressions rely on the following specification:

$$\begin{aligned}
y_{ct} = & \alpha y_{ct-1} + \beta_1 Inequality_{ct} + \beta_2 Inequality_{ct} * Culture_c + \\
& + \beta_3 Investment_{ct} + \beta_4 Education_{ct} + n_c + h_t + v_{ct},
\end{aligned} \tag{11}$$

where $Culture_c$ captures the culturally determined component of public beliefs about the importance of luck versus hard work in determining income and wealth. I will run two sets of regressions, using the continuous variable $\widehat{Beliefs}_c$ and the dummy variable based on it as alternative measures of $Culture_c$. The higher value for $\widehat{Beliefs}_c$, the stronger the belief that income heterogeneity stems from pure luck (σ_η^2) rather than from varying levels of effort and skills (σ_δ^2). The continuous version of the culture variable thus captures the relative strength of the egalitarian cultural background. Analogously, the dummy version of the culture variable takes value one for egalitarian countries and value zero for laissez-faire countries.

As argued in the theoretical part, the perceived rules of game (σ_η^2 versus σ_δ^2) are different across countries but stable over time. The direct effect of time-invariant $Culture_c$ on growth will thus be captured by the fixed effects n_c . The main variable of interest is the interaction term between the culture variable and the time varying measure of inequality. A significant coefficient β_2 would imply that the cultural character of a country affects its internal growth-inequality dynamics. The control variables take into account the importance of physical and human capital accumulation for economic growth. I rely on the standard proxies used in the empirical growth literature. $Investment_{ct}$ is the share of investment in the GDP, and $Education_{ct}$ represents the average number of years of secondary schooling in country c at time t .

I rely on bootstrapped standard errors when estimating regression (11). Both continuous and dummy version of $Culture_c$ are namely based on a variable ($\widehat{Beliefs}_c$) that is estimated from (9) rather than observed. Given this two-step procedure, one could interpret regressions (9) and (11) as the first and second stages of an IV estimation. However, given that (9) is a purely cross-sectional and (11) a purely within estimation, one cannot

perform formal overidentification tests.

Employing the estimation result from cross-country regression (9) in within-country regression (11) possesses an important advantage. In purely cross-sectional growth regressions, it is very difficult to distinguish the effects of religion and other country characteristics like institutions or geography (Guiso et al. 2003, p. 230f; Becker and Woessmann 2009 p. 533). By contrast, the dynamic panel data estimation (11) controls for country fixed effects n_c , which also capture the direct effect of culturally determined beliefs on economic growth. Any omitted variable would now have to operate via the joint dynamics of inequality and growth within countries. In particular, a potential bias in estimating the coefficients β_1 and β_2 would have to involve changes in inequality and how they relate to changes in economic growth.

Another support for specification (11) comes from the recent evidence suggesting that the direct effect of religion on economic growth works mostly via accumulation of human capital. Becker and Woessmann (2009) argue that the decisive economic consequence of Luther’s reformation might not have been the emergence of the so-called “Protestant work ethic” but rather the increased demand for literacy, so that everyone would be able to read the Bible. The authors corroborate their hypothesis by showing that the differences in literacy can almost fully explain the differing economic outcomes between Catholic and Protestant regions in the nineteenth-century Prussia. Similarly, the high quality of the US Catholic education system is commonly given credit for the higher observed wages of Catholics in the United States (Guiso et al. 2003, p. 231). The inclusion of human capital accumulation variable $Education_{ct}$ in specification (11) thus significantly lowers the risk of violating the exclusion restriction when using religion to isolate the culturally determined component of beliefs ($\widehat{Beliefs}_c$).

Admittedly, it is virtually impossible to rule out every single bias when examining the effect of culture on economic outcomes on the country level. Nevertheless, the above arguments suggest that at least some of the empirical issues can be addressed by the combination of the cross-sectional “first stage” regression and the dynamic panel data estimation techniques described in the next subsection.

4.3 Dynamic Panel Data Estimation Techniques

Specification (11) controls for country fixed effects. The OLS estimation will therefore not suffer from the bias caused by the presence of non-observable country-specific factors that can be correlated with included regressors. However, the standard fixed effects estimation takes into account neither the presence of a lagged dependent variable in the dynamic specification nor the potential endogeneity of other explanatory variables. To take care of these two problems, Arellano and Bond (1991) developed an estimator that is now known as the difference GMM estimator. This panel data estimator takes the first-differences of (11) and then uses lagged values in levels of variables as instruments. The estimator is consistent if the instruments are valid and the residuals in the first-differenced equation display no second-order serial correlation.⁹ The advantage of the GMM framework is the possibility for testing the validity of those assumptions. The standard tools for this are the Sargan test of overidentifying restrictions and the Arellano-Bond tests for serial correlation. The difference GMM estimation was first applied to examine the inequality-growth link by Forbes (2000).

There are two potential problems with the use of the original difference GMM estimation - overfitting and weak instruments. The first problem can occur when the researcher uses all available lagged value as instrumental variables, as was done by Forbes (2000). In this case, the number of instruments gets easily too large relative to the size of the cross-section, leading to a finite sample bias. A natural remedy is to reduce the number of instruments by using fewer lags than available. The second problem is more fundamental. When time series are persistent, the lagged levels of variables will represent only weak instruments for the first differences. This leads to both finite sample bias and weak identification when using the difference GMM estimation.¹⁰ As pointed out by Bond et al. (2001), it is quite a realistic scenario in the context of growth empirics. In practice, both problems can be detected by looking at the estimated coefficient on the lagged de-

⁹On the other hand, the first-order serial correlation is expected to be negative. For details see Bond (2002) and Bond et al. (2001).

¹⁰For a more detailed treatment of this issue see, e.g., Bond (2002).

pendent variable. Overfitting and weak instruments lead to a downward finite sample bias, the same problem that the standard fixed effects estimation suffers from. So if the coefficient on the lagged dependent variable estimated by GMM is close to, or even below, the value obtained by the standard fixed effects estimation, one has to assume the presence of overfitting and/or weak instruments. Additionally, the p-value for the Sargan test close to 1 also signals the presence of overfitting.

The system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998), deals with the problem of weak instruments. In the case of highly persistent series, this estimator has superior finite sample properties and achieves better identification than the difference GMM estimator.¹¹ Intuitively, the system GMM estimator does not rely exclusively on the first-differenced equations but also exploits information contained in the original equations in levels.¹² This proves to be especially helpful in the case of highly persistent series that are typical for the variables used in growth regressions. In the context of inequality and growth, the system GMM estimation was used, e.g., by Voitchovsky (2005).

The dynamic GMM estimators are asymptotically consistent but have a relatively large variance in finite samples, compared with the standard Least-Squares Dummy Variables (i.e., fixed effects) estimator. Kiviet (1995) developed the bias-corrected Least-Squares Dummy Variables (LSDVC) estimator, which takes this trade-off between consistency and efficiency into account. Using Monte Carlo simulations, Kiviet (1995) shows that, in finite samples, the LSDVC estimator often outperforms GMM estimation techniques. The advantages of the LSDVC estimator are especially pronounced in cross-country dynamic panels like the one in this paper. The dynamic GMM methods were namely developed for the microeconomic panel data with a short time (T) and a large cross-sectional (N) dimension, and their desirable asymptotic properties are derived when $N \rightarrow \infty$. Judson and Owen (1999) document that, in a standard macroeconomic panel

¹¹For details see Bond (2002), Bond et al. (2001), and the references cited there.

¹²Formally, the system GMM estimator imposes a stationarity restriction on the initial conditions. This assumption yields additional moment conditions which enable the use of the lagged first-differences as valid instruments for the level equations. For details see Bond (2002) and Bond et al. (2001).

with a small cross-sectional dimension, the LSDVC estimator routinely outperforms the GMM estimators.¹³ In this paper, I rely on the improved version of the LSDVC estimator, developed by Bruno (2005) and applicable to unbalanced panels. To document the robustness of the results, and for a better comparison with the existing inequality-growth literature, I also employ standard fixed effects and system GMM estimation techniques.

5 Empirical Results

In this section, I provide empirical evidence supporting the theoretical predictions of the paper. First, I present the results of estimating equation (9). These allow a division of countries according to their egalitarian or laissez-faire cultural background. Next, I show evidence for the presence of the mechanism underlying my story. In particular, I demonstrate that a negative correlation between the changes in government interventions and the changes in inequality is stronger within egalitarian countries. The result also holds, to a somewhat lesser extent, for the changes in interventions and the changes in economic growth. Finally, I turn to reduced form estimates (equation 11), showing that the inequality-growth link tends to be more positive in countries with the egalitarian cultural background.

The estimation results of (9) are reported in Table 1 and confirm that countries' cultural background has a significant impact on people's economic beliefs. Higher proportions of mainstream Christians (Catholics and mainstream Protestants) and disciples of Eastern religions (such as Taoism or Confucianism) reinforce egalitarian beliefs in a country. People in countries characterized by a higher share of other Christians (e.g., Evangelicals) and Hinduists/Buddhists tend to have more laissez-faire attitudes. The omitted category is the share of people without religious affiliation and adherents of smaller religions. Coefficients for all included religious groups are highly significant, and the overall F-statistics is 11.03. The adjusted R^2 is above 31 per cent.

¹³Judson and Owen (1999) use in their simulations $N=20$ or $N=100$ and $T=5$, $T=10$, $T=20$, or $T=30$. This corresponds to a standard macroeconomic dynamic panel like the one used in this paper.

One advantage of Robert Barro's Religion Adherence Data Set is that it distinguishes between mainstream Protestants and other Christians, with the latter including many Evangelicals (McCleary and Barro 2006). In the framework of this paper, this is a potentially important distinction. Equation (9) estimates the effect of long-standing culture (proxied by religion) on the beliefs about fairness of income heterogeneity. If the case of the United States is any guide, the dividing line might in this case run between mainstream Christians (including Catholics and mainline Protestants) on one side and Evangelicals on another side.

The empirical results support this conjecture. When I allow the shares of Catholics and mainstream Protestants to enter equation (9) separately, both estimated coefficients are positive and statistically significant (not reported). They are also quantitatively very similar (1.108 and 1.258) and statistically not different from each other (F-statistics equals 0.13). The value and the significance of other coefficients are also not substantially affected by the separation of the Catholic and mainstream Protestant shares in countries' overall population, with the adjusted R-squared of the estimation actually declining. As the differentiation between the two religious shares does not seem to provide any additional information, the mainstream Christians enter the equation (9) together.

Although not the main point of this paper, the results about Catholics, mainstream Protestants, and other Christians are interesting in the context of existing literature on economic consequences of countries' cultural background. Following the famous thesis about Protestant work ethic by Max Weber, a large part of cross-countries studies on religion and economics has focused on the differential impact of Catholicism and Protestantism on economic growth (cf. studies described in Guiso et al. 2003 and Becker and Woessmann 2009). This literature could actually lead to some concerns about violation of exclusion restriction when I later estimate the set of within-country growth regressions (11). Imagine that the shares of Catholics and mainstream Protestants had different or even opposing effect on belief in luck as the main determinant of success in life. Max Weber's channel could then partially drive the different growth-inequality dynamics within

culturally laissez-faire and culturally egalitarian countries.¹⁴ The common results for both groups of mainstream Christians in the cross-sectional setting (9) are thus reassuring and place confidence in the next set of results examining the different dynamics of economic variables in laissez-faire versus egalitarian countries.

I use the estimated coefficients from equation (9) to compute the culturally determined component of beliefs for every country ($\widehat{Beliefs}_c = \widehat{\alpha} + \widehat{\beta}ReligionShares_c$). This value also serves to divide the sample into equally large groups of 19 egalitarian and 19 laissez-faire countries. In particular, the dummy version of the culture variable is equal to one for countries whose value of $\widehat{Beliefs}_c$ is above the median of the sample and zero otherwise. Table 2 provides more detail.

[Table 1 about here]

[Table 2 about here]

In the story underlying this paper, governments vary the degree of state interventionism in order to meet the shifting demand for a socially acceptable level of inequality, driven by shocks to the fairness parameter γ . Simultaneously, the alternation of government interventions also affects economic growth. After identifying the cultural background of countries, I examine whether the outlined mechanism is stronger within egalitarian countries. Tables 3 and 4 provide support for this theoretical prediction by investigating the correlation patterns of first-differenced economic variables within countries.¹⁵

Table 3 shows that increases in government interventions are generally associated with decreases in inequality. Importantly, the negative correlation between changes in interventions and changes in inequality is stronger for the group of egalitarian countries. The difference between mean correlations of the two country groups is both quantitatively important and statistically significant at the 3 per cent level.

¹⁴The inclusion of *Education* in equation (11) already takes care of the novel channel from religion via human capital education to economic growth introduced by Becker and Woessmann (2009).

¹⁵Too few data points for a given country could generate spuriously high correlations close to -1 or 1. To avoid this, only countries with at least 6 observations for first-differenced variables are considered when computing the within correlations in Tables 3 and 4. For that reason, the number of all countries is lower than in the growth regressions reported later.

The evidence for a negative effect of an increase in government interventions on economic growth is less clear-cut but still present. Table 4 provides the details. On the one hand, there is no link between interventions and economic performance within laissez-faire countries. On the other hand, surges in interventions are associated with decelerating economic growth within egalitarian countries.¹⁶ The difference between average correlations in both groups is significant at the 12 per cent level.

[Table 3 about here]

[Table 4 about here]

Finally, I examine whether the relevance of countries' cultural background can still be detected in the reduced form relationship between inequality and growth. Tables 3 and 4 affirm that the culturally determined beliefs can alter the political economy mechanism driving the within-country dynamics between redistribution on the one side and inequality or growth on the other side. Given this evidence, the reduced form estimates might reveal a different pattern of inequality-growth relationship in egalitarian and laissez-faire countries. To see whether this is the case, I run a series of growth panel data regressions based on equation (11), which controls for country fixed effects and thus captures the dynamics within countries.

Table 5 and Table 6 report the results of three panel data regressions: the standard fixed effects estimation, the system GMM estimation with a reduced number of instruments, and the bias-corrected Least-Square Dummy Variables (LSDVC) estimation. The dependent variable is the level of output. The independent variables are inequality and the usual controls - the share of investment in the GDP and the average number of years of secondary schooling. Time dummies are included in all regressions. The novelty is the inclusion of an interaction term between two variables - *Inequality_{ct}* and *Culture_c*. The latter variable captures the culturally determined component of economic beliefs in

¹⁶Table 4 reports only the standard 95% confidence interval, but the mean correlation for egalitarian countries is significantly negative at the 6% level. Concretely, the 94% confidence interval is (-0.295; -0.005).

a given country. Table 5 deploys the dummy version of the culture variable, which takes value one for egalitarian countries and value zero for laissez-faire ones. Table 6 relies on the continuous version of the culture variable.

[Table 5 about here]

The first column of Table 5 reports the results of the standard fixed effects estimation. The coefficient on the interaction term (Inequality*Culture) is positive and significant at the 10% level. This means that the positive correlation between variations in inequality and variations in growth is stronger within egalitarian countries. The difference is quantitatively important, as the point estimate for the coefficient on the interaction term is almost double the point estimate for the inequality coefficient.

To account both for the presence of a lagged dependent variable among the regressors and for the potential endogeneity of other right-hand-side variables, I turn to the GMM estimation that was developed by Arellano and Bond (1991) and improved by Arellano and Bover (1995) and Blundell and Bond (1998). In other words, I employ the system GMM estimation with a reduced set of instruments. As the focus of the paper lies on the interplay between culture and inequality-growth dynamics, I employ one lag of inequality and one lag of the inequality-culture interaction term as instruments. Given the importance of the lagged dependent variable in this framework, I also include a second lag of the output into the instrument set. This parsimonious set of lagged variables addresses the issue of overfitting that can occur in the presence of too many instruments.

The results are shown in the second column of Table 5. The estimated coefficient for the main variable (Inequality*Culture) is still positive, confirming a stronger positive co-movement of inequality and growth within egalitarian countries. The significance level for the interaction term improves from 9.9% to 7%, despite the decrease in the point estimate. The use of the system GMM thus leads to an improvement in the precision with which the difference between egalitarian and laissez-faire countries can be estimated. The Arellano-Bond tests for autocorrelation and the robust Sargan test are satisfied.

Moreover, overfitting does not seem to be a problem with the applied instrument set, as the p-value for the Sargan test is firmly below 1. The GMM system approach is also supposed to correct for downward bias on the coefficient of the lagged dependent variable present in other within estimations. And indeed, the coefficient on the lagged output is now higher than in the standard fixed effects estimation.

The last column reports the results for the LSDVC estimator. As argued in Subsection 4.3, the LSDVC estimation is of particular interest in case of the macroeconomic dynamic panels like the one used in this paper. The stronger co-movement of inequality and growth within egalitarian countries survives when using this regression technique. The main variable (Inequality*Culture) is now even more significant, with a p-value of 3.2%.

So far I have classified every country as either egalitarian or laissez-faire. This binary approach was motivated by the two steady states derived in Alesina and Angeletos (2005). In reality, countries' cultural backgrounds can cover the whole range from strictly laissez-faire to strongly egalitarian. As yet another test, I therefore examine whether the strength of the egalitarian cultural background intensifies the positive co-movement of inequality and growth within countries. I use the culturally determined component of peoples' belief in "luck as the main source of success in life" from the second column of Table 2. This continuous variable is a proxy for the strength of the egalitarian cultural background in a given country. Table 6 reports the results employing this continuous cultural proxy. The specification and the regression techniques (the standard fixed effects, the system GMM, and the LSDVC estimation) are the same as in Table 5, but inequality is now interacted with a continuous cultural variable rather than with a culture dummy.

The results confirm that a stronger egalitarian cultural background generates a starker co-movement of inequality and growth within countries. The interaction term is always positive and, with the exception of the system GMM estimation, also significant. The results in the first and third columns are even stronger than in the case of the dummy version of the culture variable. In the standard fixed effects estimation, the main variable (Inequality*Culture) only narrowly misses the 5% significance level, with a p-value reaching 5.7%. The highly significant result for the interaction term in the case of the LSDVC

regression is especially noteworthy, as this estimation approach is probably the most suitable for macroeconomic dynamic panels with a moderate cross-sectional dimension.

[Table 6 about here]

The overall message from the reduced form regressions is that the internal dynamics of inequality and economic growth differ between egalitarian and laissez-faire countries. Specifically, the two variables seem to be more positively correlated within countries that for cultural reasons believe that luck and good connections, rather than hard work, lead to personal success. Both the presence and the intensity of the egalitarian cultural background play an important role in shaping the joint dynamics of real economic variables like inequality and growth within countries over time.

6 Conclusion

This paper documents a stronger dynamic interplay between government interventions, inequality, and growth in countries with the egalitarian cultural background. In particular, increases in government interventions are there associated with stronger decreases in both inequality and economic growth, compared to culturally laissez-faire countries. This mechanism generates in turn a stronger positive co-movement between inequality and growth within egalitarian countries over time.

The presented results suggest that one should be careful when inferring causality from the positive inequality-growth link found in the within estimations without accounting for possible cultural differences across countries. This reflects a more general problem in the literature. Cross-sectional and within estimations are all too often regarded as alternative econometric techniques that are equally well designed to address the same questions. However, the use of the within estimation fundamentally changes the economic interpretation of the regression results.¹⁷ This is especially true if cultural factors affecting

¹⁷Durlauf et al. (2005) make this point in the context of β -convergence. Their summary of the discussion between Islam (1995, 1998) and Lee et al. (1998) shows how switching between different estimation techniques substantially changes the economic interpretation of the empirical results.

the internal political-economy process come into play.

The paper also made a more general contribution to the booming literature on culture and economics. The idea that cultural factors have a strong impact on long-run economic outcomes has meanwhile gained a broad acceptance in our profession. This paper examines a more subtle channel through which culturally determined beliefs affect the economic processes. It shows that the cultural background can shape the joint dynamics of economic variables within countries over time. Here I focused on the relationship between government interventions, inequality, and growth. An interesting direction for future research could explore whether cultural factors shape the within-country dynamics of other economic variables as well.

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Appendix A: Impact of Redistribution on Inequality and Growth

This appendix documents a negative correlation between redistribution and inequality, as well as between redistribution and economic growth, within the theoretical framework of Alesina and Angeletos.

One can show - building upon the derivation from the technical appendix of Alesina and Angeletos (2005) - that for a stationary history ($\tau_s = \tau$ for all previous generations $s \leq t - 1$) wealth in period t is given by:

$$\begin{aligned} w_{it} &= (1 - \tau_t)^2 \delta_i + (1 - \tau_t) \eta_i + (1 - \tau_t) \alpha \left[\frac{1}{1 - \alpha(1 - \tau)} ((1 - \tau)^2 \delta_i + (1 - \tau) \eta_i + G) \right] + G_t \\ &= \left\{ (1 - \tau_t)^2 + (1 - \tau_t) \frac{\alpha}{1 - \alpha(1 - \tau)} (1 - \tau)^2 \right\} \delta_i + \\ &\quad + \left\{ (1 - \tau_t) + (1 - \tau_t) \frac{\alpha}{1 - \alpha(1 - \tau)} (1 - \tau) \right\} \eta_i + (1 - \tau_t) \frac{\alpha}{1 - \alpha(1 - \tau)} G + G_t. \end{aligned}$$

The variance of wealth, which gives a natural measure of inequality in this model, is thus given by:

$$\begin{aligned} Var(w_{it}) &= \left\{ (1 - \tau_t)^2 + \frac{\alpha}{1 - \alpha(1 - \tau)} (1 - \tau_t) (1 - \tau)^2 \right\}^2 \sigma_\delta^2 + \\ &\quad + \left\{ (1 - \tau_t) + \frac{\alpha}{1 - \alpha(1 - \tau)} (1 - \tau_t) (1 - \tau) \right\}^2 \sigma_\eta^2 \\ &= \left\{ (1 - \tau_t)^2 + \frac{\alpha}{1 - \alpha(1 - \tau)} (1 - \tau_t) (1 - \tau)^2 \right\}^2 \sigma_\delta^2 + \\ &\quad + (1 - \tau_t)^2 \left[1 + \frac{\alpha(1 - \tau)}{1 - \alpha(1 - \tau)} \right]^2 \sigma_\eta^2, \end{aligned}$$

which is obviously decreasing in τ_t .

Now we turn to the relation between redistribution and economic growth. Evaluating the pre-tax wealth (equation 1) at the optimum yields:

$$\begin{aligned} y_{it} &= A_{it} [(1 - \tau_t) A_{it} \beta_{it}] + \eta_{it} + \alpha w_{it-1} \\ &= (1 - \tau_t) \delta_{it} + \eta_{it} + \alpha w_{it-1}. \end{aligned}$$

Aggregating output across all agents gives:

$$\begin{aligned}\int_i y_{it} &= (1 - \tau_t) \int_i \delta_{it} + 0 + \alpha \int_i w_{it-1} \\ \bar{y}_t &= (1 - \tau_t) \bar{\delta}_t + \alpha \bar{w}_{t-1}.\end{aligned}$$

The fact that the state has a purely redistributive role (no public goods) and there is no waste in redistribution (see equation 2) implies equality between pre-tax and disposable wealth of the average agent:

$$\bar{y} = \bar{w}.$$

Combining the last two expressions finally yields:

$$\begin{aligned}\bar{y}_t &= (1 - \tau_t) \bar{\delta}_t + \alpha \bar{y}_{t-1} \\ \Delta \bar{y}_t &= (1 - \tau_t) \bar{\delta}_t + (\alpha - 1) \bar{y}_{t-1}, \\ \text{where } \Delta \bar{y}_t &\equiv \bar{y}_t - \bar{y}_{t-1}.\end{aligned}$$

Besides the standard convergence effect ($\alpha - 1 < 0$), economic growth is also decreasing in the level of redistribution τ_t .

Table 1: Cultural Content of Economic Beliefs

The dependent variable is the average belief in luck as the main determinant of success in life. Mainstream Christians, Other Christians, Hinduists/ Buddhists, Eastern Religions are the shares of mainstream Christians (Catholics and Protestants), other Christians, Hinduists and Buddhists, and disciples of Eastern religions in the country's population in the year 1970. Robust standard errors are in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)
Mainstream Christians	1.142** (0.475)
Other Christians	-2.877*** (0.875)
Hinduists/Buddhists	-1.060** (0.487)
Eastern Religions	2.231** (0.843)
Constant	3.793*** (0.399)
Observations	38
F-statistics	11.03
R-squared	0.386
Adjusted R-squared	0.311

Table 2: Egalitarian versus Laissez-Faire Cultural Background of Countries

The second column reports the culturally determined component of belief in luck as the main determinant of success in life. The value is computed from shares of religious denominations and estimated regression coefficients from Table 1 [Instrumented Beliefs = 1.142*(Main Christians) - 2.877*(Other Christians) - 1.060*(Hinduists/Buddhists) + 2.231*(Eastern Religions) + 3.793]. The third column assigns value of culture dummy equal to one (zero) for countries whose value for the culturally determined part of economic beliefs is above (below) the median of the sample.

Country	Culture (continuous)	Culture (dummy)
India	2.909976	0
South Africa	3.245476	0
United States	3.300437	0
Japan	3.497883	0
Bangladesh	3.610849	0
Pakistan	3.782338	0
Turkey	3.794984	0
Canada	3.798707	0
Australia	3.979676	0
Korea, Republic of	4.053463	0
New Zealand	4.127990	0
Philippines	4.217050	0
Chile	4.252233	0
China	4.303395	0
United Kingdom	4.307251	0
Netherlands	4.329858	0
Dominican Republic	4.435601	0
Taiwan	4.467161	0
Uruguay	4.498932	0
Sweden	4.611602	1
Iceland	4.634876	1
Mexico	4.691147	1
Brazil	4.710959	1
France	4.719552	1
Portugal	4.735952	1
Venezuela	4.745810	1
Argentina	4.778557	1
Italy	4.785325	1
Belgium	4.786256	1
El Salvador	4.797851	1
Austria	4.831358	1
Finland	4.840032	1
Denmark	4.863513	1
Ireland	4.870833	1
Norway	4.871383	1
Spain	4.881791	1
Peru	4.891136	1
Malta	4.921308	1

Table 3: Correlation of Changes in Inequality and Government Interventions within Countries

This table investigates the correlation patterns between first-differenced inequality and government interventions within countries. Laissez-Faire (Egalitarian) countries are countries with value zero (one) in the third column of Table 2. Only countries with at least 6 observations for examined first-differenced variables are considered.

Countries (Observations)	Mean (Std Error)	Standard Deviation	95 % Confidence Interval
Laissez-Faire (14)	-0.233 (0.091)	0.342	(-0.430 ; -0.036)
Egalitarian (12)	-0.519 (0.081)	0.279	(-0.696 ; -0.342)
All Countries (26)	-0.365 (0.067)	0.341	(-0.503 ; -0.227)
Difference	0.286 (0.124)		(0.030 ; 0.541)
Mean Comparison Test			
t-Statistics			t = 2.308
Significance Level			0.030

Table 4: Correlation of Changes in Growth and Government Interventions within Countries

This table investigates the correlation patterns between first-differenced economic growth and government interventions within countries. Laissez-Faire (Egalitarian) countries are countries with value zero (one) in the third column of Table 2. Only countries with at least 6 observations for examined first-differenced variables are considered.

Countries (Observations)	Mean (Std Error)	Standard Deviation	95 % Confidence Interval
Laissez-Faire (15)	0.018 (0.075)	0.289	(-0.142 ; 0.178)
Egalitarian (15)	-0.150 (0.071)	0.275	(-0.302 ; 0.002)
All Countries (30)	-0.066 (0.053)	0.290	(-0.174 ; 0.0420)
Difference	0.168 (0.103)		(-0.043 ; 0.379)
Mean Comparison Test			
t-Statistics			t = 1.632
Significance Level			0.114

Table 5: Presence of Egalitarian Cultural Background and the Inequality-Growth Dynamics

The dependent variable is the level of output. All regressions control for country and time fixed effects. The main variable of interest is (Inequality*Culture): the interaction term between inequality and culture dummy from the third column of Table 2. The control variables include level of inequality, output level at time t-1 (Lagged Output), average number of years of secondary schooling (Education), and the share of investment in the GDP (Investment). Column (1) reports results of the standard fixed effects estimation, column (2) reports results of the system GMM estimation (Arellano and Bover 1995, Blundell and Bond 1998), and column (3) reports results of the bias-corrected Least-Squares Dummy Variables estimation (Kiviet 1995, Bruno 2005). Bootstrapped standard errors are in parentheses. Constant term is not reported. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	Fixed Effects	System GMM	LSDVC
Inequality	0.006* (0.003)	-0.002 (0.005)	0.008** (0.003)
Inequality*Culture	0.010* (0.006)	0.002* (0.001)	0.010** (0.004)
Lagged Output	0.726*** (0.059)	0.829*** (0.066)	0.794*** (0.034)
Education	0.026** (0.011)	0.024 (0.017)	0.023** (0.010)
Investment	0.011*** (0.002)	0.017*** (0.004)	0.010*** (0.002)
Observations	260	260	260
Number of Countries	38	38	38
Arrelano-Bond Test for AR(1)		0.001	
Arrelano-Bond Test for AR(2)		0.773	
Sargan-Hansen Test (robust)		0.461	

Table 6: Intensity of Egalitarian Cultural Background and the Inequality-Growth Dynamics

The dependent variable is the level of output. All regressions control for country and time fixed effects. The main variable of interest is (Inequality*Culture): the interaction term between inequality and the culturally determined component of people's beliefs from the second column of Table 2. The remaining variables are defined in Table 5. Column (1) reports results of the standard fixed effects estimation, column (2) reports results of the system GMM estimation (Arellano and Bover 1995, Blundell and Bond 1998), and column (3) reports results of the bias-corrected Least-Squares Dummy Variables estimation (Kiviet 1995, Bruno 2005). Bootstrapped standard errors are in parentheses. Constant term is not reported. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
	Fixed Effects	System GMM	LSDVC
Inequality	-0.038 (0.025)	-0.010 (0.006)	-0.038** (0.019)
Inequality*Culture	0.011* (0.006)	0.001 (0.001)	0.012*** (0.004)
Lagged Output	0.728*** (0.059)	0.873*** (0.072)	0.796*** (0.034)
Education	0.029*** (0.011)	0.007 (0.016)	0.025** (0.010)
Investment	0.011*** (0.002)	0.014*** (0.004)	0.010*** (0.002)
Observations	260	260	260
Number of Countries	38	38	38
Arrelano-Bond Test for AR(1)		0.001	
Arrelano-Bond Test for AR(2)		0.552	
Sargan-Hansen Test (robust)		0.299	