A Theory of Conservative Revivals*

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Abstract

Why do some societies fail to adopt more efficient technologies and institutions in response to changing economic conditions? And why do such conditions sometimes generate conservative ideological back-lashes and, at other times, progressive social and political movements? We propose an explanation that highlights the interplay — or lack thereof — between new technologies, ideologies, and institutions. When new technologies emerge, uncertainty can result from either a greater inherent riskiness associated with the technology or from a lack of understanding how the technology will fit with the prevailing ide-ologies and institutions. In our model, uncertainty about the benefits of new technologies can discourage investment in both institutions and the cultural capital necessary to take advantage of new technologies. Accordingly, increased uncertainty during times of rapid technological change may generate a conservative ideological backlash that puts a higher premium on traditional beliefs and values, with such movements typically resisting ideological updates in light of changing economic circumstances. Hence, only when the superiority of new technologies outweighs their inherent risks does the pace of institutional change accelerate in conjunction with a more progressive ideology that deemphasizes traditional beliefs. We apply the theory to numerous historical episodes, such as the Ottoman reform initiatives, the Tongzhi Restoration in Qing China, and the Japanese Meiji Restoration, when the interplay between ideologies and institutional adaptation in the face of rapid technological progress influenced long-run economic outcomes.

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1 Introduction

Why do some societies fail to adopt sociopolitical or economic institutions that are commensurate with a changing technological and economic landscape? History is littered with instances of societies cognizant of, but failing to adopt, advanced market structures, legal codes, and organizational forms. For instance, Kuran (2011) notes that European commercial law was widely used and permitted in the Ottoman Empire, but only for European merchants. The various European legal codes permitted much more complex financial transactions than what was available to Ottoman merchants. Why did the Ottomans not adopt such obviously beneficial institutions? Likewise, the Qing Empire famously turned inward in the 17th and 18th centuries, just as contact with the West made it obvious to casual observers that Western organizational forms were far superior. In both cases, the stagnant society missed out on a transition to a more efficient economy. Given the stakes involved, why do institutional calcifications ever occur?

Even more curiously, the rejection of more efficient institutions against the backdrop of rapidly changing technologies and economic conditions is frequently coupled with a conservative ideological backlash as a result of which traditional values dominate the sociopolitical and economic discourse. And often such traditional values are incompatible with advanced technologies and institutions, because they were formed when the technological and institutional environment was drastically different. In the Ottoman case, after it was clear that Western Europe had far surpassed the Empire, it was still the case that "even the most intelligent and perceptive of Ottoman reformers at this time adhered to the basic premise that the Ottoman system was far superior to anything that the infidel might develop" (Shaw 1976, p. 175). Other examples abound: the famed "social decay" of the late Roman Empire, the inward turns of Qing China and Shogunate Japan in response to contact with Europe, and British unpreparedness for World War I are all reflective of societies built on ideologies associated with past glory but ill-suited for a much changed world. Why do such conservative movements so often go hand-in-hand with institutional stagnation?

This paper presents a model that jointly addresses both of these puzzles by *endogenizing* institutional change and ideological evolution. We employ an overlapping generations model where technology is subject to outside productivity shocks. Alternatively, one can entertain the notion that the society is not on the technological frontier but, instead, is exposed to a new technology that is also riskier.[1] There are two sources of risk associated with new technologies in our model: uncertainty can result from either a greater inherent riskiness associated with the technology or from a lack of understanding how the technology will fit with the prevailing ideologies and institutions. Ideological beliefs are passed down from parent to child as in Bisin and Verdier (2001). But parents can exert costly effort to provide their children with an education that can equip them with the means to assess the production environment through a potentially more objective lens—one that is more compatible with future technologies than their own ideology.[2] There is a self-interested political

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[1] We ignore the possibility that institutions are not adopted because they are contrary to the interest of the politically powerful. This is a widely accepted answer in the literature on *technology* non-adoption (Acemoglu and Robinson 2000, 2006; Chaudry and Garner 2007; Coşgel et al. 2012). We ignore this possibility not because it is wrong, but because it has already received significant attention (see, e.g., Kuran 2011, Koyama et al. 2016) while only accounting for certain episodes of adoption failure. Industrialization provides an instructive counter-example. Although some vested interests would have been harmed by the adoption of industrial technologies and the institutions that support an industrial economy, by the turn of the 20th century the benefits of industrialization were obvious. Yet, most of the world's population lived in non-industrialized economies.

[2] We use the term "education" in a stylized and informal sense. In fact, and as we shall elaborate further below, formal education may not be the channel through which future workers can acquire skills that enable them to more objectively comprehend the production environment in which they will be economically active. Alternatively, the channel of ideological transmission could well be a public education system that is used to propagate a political regime's (potentially self-serving and preserving) ideological and political doctrines. In that case, schooling could be free but time spent at school would instill and propagate the existing state ideologies and political doctrines. In order to escape such indoctrination, parents would need to invest in a form of private education that would provide the offspring with the cognitive skills necessary to assess the technological and

ruler who maximizes tax revenue over the infinite planning horizon. This ruler can invest in improving the society's institutions to better accommodate technology, although institutional change is costly.[3]

Our model provides two primary insights. First, there is an interplay between technological uncertainties on the one hand and ideological as well as institutional evolution on the other. In particular, the degree of risk inherent in newly-adopted technologies could drive individuals to emphasize the intergenerational transmission of their prevailing ideologies at the expense of education. This occurs despite the fact that education is the channel through which ideologies would evolve to remain compatible with new technologies. In turn, political rulers would fail to adopt "better" and more efficient institutions even if—and despite the fact that—doing so would be a first-order economic improvement. The more riskier are the new technologies, the more likely that ideologies and institutions would stagnate due to the fact that individuals are risk averse. In fact, even when adopting "better" institutions is unambiguously a first-order improvement for the society, as it is under our formulation, both the existing (backward) state of economic development and the society's ideological beliefs would be unlikely to change despite the fact that a change in either ideology or institutions might trigger a positive response in the other. But this is precisely the point; in an uncertain world, such change is too risky and thus does not happen in equilibrium.

As a relevant but simplistic practical example of this mechanism operative at the micro level, consider someone who takes the same highway to work every morning. Such a person would be sufficiently experienced and the driving conditions would be stable and predictable enough that she would get to work with maximum efficiency. Now, consider the opening of a new freeway that permits one to drive faster, while having to face minimal additional uncertainty due to the new driving conditions. In that case, it is likely that our driver would take advantage of the improved conditions provided by the new freeway. Alternatively, if the driver does not know the traffic patterns of the new freeway, which may contain significant new uncertainties and unfamiliar driving conditions, then it is more than likely that our driver would take a conservative approach and stick with her old route, at least initially, even if she knows that the *average* commute on the new freeway is shorter.

Indeed, there is a significant body of literature in psychology which indicates that individuals with heightened sense of risk and lower risk tolerance tend to be more conservative (Jost 2006; Haidt 2012). As stated by Laber-Warren (2012), for instance: "Psychologists have found that conservatives are fundamentally more anxious than liberals, which may be why they typically desire stability, structure and clear answers even to complicated questions. 'Conservatism, apparently, helps to protect people against some of the natural difficulties of living.'"

This noted, we differ from the existing studies in psychology in that we do not take as given individuals being conservative or liberal. Indeed, our main contribution to the related literatures in political economy, sociology, and psychology is that we attempt to identify the economic conditions in which individuals could become more conservative or liberal. In our model, conservatism is an *outcome*; it is not a cause of failure to adopt more efficient institutions and technologies.[4]

Our second insight follows from the fact that technological progress and uncertainty about new technologies often arise together. For one, new technologies can represent a fundamentally new way of producing or consuming at the expense of what one knows and is comfortable with. Moreover, new technologies—especially those with a foreign origin—may not be compatible with the existing resource, institutional, or

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productive environment more objectively. We shall revisit this issue in subsection 2.2 below.

[3] In making his optimal choice, the ruler may or may not take as given his subjects' ideological beliefs. In Section 4, we elaborate on this point and also look at the situation in which the ruling political classes can use the public education system to propagate ideological beliefs that are consistent with their self interests.

[4] For more on conservatism as an outcome of institutional environments, see Rubin (2011; 2017)

ideological bases. Our model indicates that when uncertainty dominates, institutions and ideologies are unlikely to respond to technological change. Hence, a "catch-22" arises where ideologies do not evolve, and as a consequence institutions don't upgrade. Meanwhile, it is precisely because institutions do not evolve that ideologies stagnate. In such a case, the conservative backlash is all the more pronounced as the traditional ideology is ascribed to in spite of a rapidly changing world ill-suited for old ideologies.

This paper is not the first to suggest an interaction between culture and institutions.[5] Tabellini (2010) provides empirical evidence that numerous cultural attributes—many of which are strong predictors of modern economic well-being—are consequences of a society's institutional past. Putnam (1993) shows how different cultural characteristics related to social capital in northern and southern Italy—remnants of the medieval period—affected institutional changes in the 20th century.[6] Greif (1994, 2006) argues that the individual/collectivist cultural distinction directly influenced the distinct types of economic institutions of the (individualistic) Italian city-states and the (collectivist) Maghribi traders. By contrast, Greif, Iyigun and Sasson (2012) and Greif and Iyigun (2013) claim that cultural differences in risk sharing and management could go some way in explaining the historically divergent economic paths of China versus England. And Gorodnichenko and Roland (2011, 2016) argue that this cultural distinction is at the root of differences in innovation across societies.[7]

The recent theory paper most similar to ours is Bisin and Verdier (2015), who also study the coevolution of institutions and culture. They argue that culture and institutions may act as complements or substitutes. In the former (latter) case, the interaction of the two strengthens (weakens) the equilibrium patterns and institutions are more (less) likely to produce their desired effect.[8] Acemoglu and Jackson (2016) investigate the coevolution of social norms and the enforcement of codified laws. They argue that laws which are in conflict with prevailing social norms may be counterproductive; it is only when such laws are gradually introduced that they are effective. Both Bisin and Verdier (2015) and Acemoglu and Jackson (2016) provide valuable insights into the coevolution of institutions and culture. But one important aspect of this coevolution which both papers fail to adequately address is why institutions fail to update in the face of exogenous (technological or institutional) shocks which make the prevailing institutions and ideological beliefs obsolete.[9] This is hardly a trivial issue; failure to adopt modern institutions is a primary reason for the failure of laggard economies to converge with the leaders (North 1981; Greif 2006; Kuran 2011; Rubin 2017). Our

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[5] For overviews of recent developments of various aspects of this literature, see Guiso et al. (2006), Nunn (2012), Spolaore and Wacziarg (2013), Algan and Cahuc (2013), Alesina and Giuliano (2015), and Gershman (2016).

[6] Guiso et al. (2016) test Putnam's hypothesis and find that medieval institutions entailed differences in social capital which had an impact in northern Italy but not in southern Italy.

[7] There are many other important recent works on the interaction of culture and institutions. For instance, Tabellini (2008) argues that "generalized morality" (i.e., individual values that support the generalized application of norms of good conduct) evolves from a society's institutional past and is related to well-functioning institutions in the present. Greif and Tabellini (2015) build on these insights, showing how kin-based cultures coevolve with clan-based enforcement institutions while "generalized morality" cultures coevolve with more corporate, group-independent institutional forms. Alesina et al. (2013) study the link between traditional plough agriculture (and its associated institutions) and the evolution of gender norms. Lowes et al. (2015) find that descendants of the Central African Kuba kingdom, which historically had more formal institutions than its neighbors, have weaker rule-following norms today. For more economic insights into the "long hand" of culture, see Giuliano (2007), Guiso et al. (2008), Nunn and Wantchekon (2011), Voigtländer and Voth (2012), Jha (2013), Grosfeld et al. (2013), Becker et al. (2016), and Buggle (2016).

[8] Greif and Tadelis (2010) provide a model of institutional and cultural evolution where people "hide" their culture in the face of oppressive institutions. This paper differs from ours in that we seek to understand why culture and institutions do not co-evolve together despite favorable circumstances, whereas Greif and Tadelis focus on a situation where culture does not evolve in spite of institutional evolution.

[9] The model in Bisin and Verdier (2015) has institutional design built into it. It therefore does not address how institutions and culture coevolve in response to a shock that changes the conditions under which the institutions were originally designed. An implication of Acemoglu and Jackson (2016) is that such a shock could be accounted for by gradual institutional change. But there are numerous counter-examples discussed in this paper that challenge such processes happening in economic history. An alternative approach is therefore needed to account for these observed phenomena.

paper addresses precisely this issue. Moreover, it is the first example of its kind to link the interplay among technologies, culture, and institutions on the one hand with sociopolitical movements that come about due to the former, on the other.[10]

This paper proceeds as follows. Section 2 lays out the model. Section 3 provides some historical examples pertinent to our model. Section 4 offers some concluding thoughts and discusses paths of future research direction.

2   The Model

2.1   Setup

Consider an infinite-horizon, overlapping generations economy with one representative young agent, one representative old agent, and a Ruler (R) in each period.[11] Each agent lives for two periods (one young and one old) except for the Ruler, who is infinitely-lived. Old agents are productive but young agents are not. Old agents have preferences over their own consumption and the consumption possibilities of their children, while the Ruler has preferences over current and future tax revenue.

Old agents are endowed with one unit of time, which they can only spend on labor ($\ell_t \in [0,1]$). The output produced by their labor is $y_t = A_t \ell_t$, where A_t is a productivity parameter. A_t has three components: a technology component (G_t), the economy's institutions ($I_t \in \mathbb{R}^+$), and the workers' (old agents') ideology ($D_t^o \in \mathbb{R}^+$). We explain the determinants of each of these factors in turn.

First, the realization of G_t is comprised of a deterministic component and a positive or negative shock such that, with probability $p \in [0,1]$, the effective level of technology is above its deterministic term (i.e., $G_t = G + g > 0$), and with probability $1 - p$, it is below it (i.e., $G_t = G - g$). Note that, in the symmetric case in which $p = 0.5$, we have $E(G_t) = G$. We restrict $G_t \geq 0$, entailing that $g \leq G$.

Second, ideology is formed when agents are young and transmitted to them from their parents. In subsection 2.2.2 below, we define what ideologies entail and discuss the various mechanisms through which they may intergenerationally be transmitted.

Third, I_t denotes the efficacy of institutions in period t, which is affected by the extent of institutional investment adopted by the Ruler in a manner we shall discuss immediately below.

Taken together, the effective total factor productivity of the economy, A_t, is determined by the combination of technology, ideology and institutional efficacy according to a constant elasticity of substitution production function with elasticity of substitution parameter $\theta \in (-\infty, 1)$ and share parameters $\{\alpha, \beta\} \in [0,1]$, where $\alpha + \beta \leq 1$. In particular, we have

$$A_t = \left[\alpha \left(G_t \right)^\theta + \beta \left(D_t^o \right)^\theta + (1 - \alpha - \beta) \left(I_t \right)^\theta \right]^{\frac{1}{\theta}}. \tag{1}$$

In what follows, we determine the intertemporal steady state of our economy. We then consider the dynamic evolution of the economy in response to the two types of technology shocks: permanent productivity improvements as exemplified by higher G, such that $\widehat{G} = G + \Delta G$ for some $\Delta G > 0$, and transitory shocks

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[10] In a recent empirical paper, Giuliano and Nunn (2016) show that, consistent with the anthropology literature, societies tend to emphasize traditional values more in relatively stable and predictable environments. In other words, they show that uncertainty and conservative values are negatively correlated cross sectionally and over time. Although greater uncertainty can instigate conservatism in our model, these findings are consistent with our theoretical framework as well, as we shall elaborate further below.

[11] There is no population growth in the model because our empirical applications are not affected by population growth. Interesting dynamics with respect to population growth could arise, but they do not alter the fundamental insights of the model.

that increase volatility and are represented by higher g such that $\widehat{g} = g + \Delta g$, for some $\Delta g > 0$. Since $G_t \geq 0$, we restrict Δg such that $\Delta g \leq \widehat{G} - g$.

2.2 Ideologies and Mechanisms of Intergenerational Transmission

2.2.1 Definitions & Functions

A salient feature of ideology is that it helps individuals make generalizations about the complex environment within which they operate and about which they have incomplete knowledge. Accordingly, ideologies not only influence how individuals interpret their experiences but they also complement the factual information they possess. Implicit in these assertions is the notion that ideologies may be economically useful. Indeed, the roots of the idea that ideologies help to serve an economic purpose can be traced back to Adam Smith who recognized one form of ideology, religion, as a rational means for individuals to enhance their human capital (North 1981, p. 49; Iyigun, Mocan and Owen 2001).

Naturally, the purpose of ideologies can be interpreted in different ways. For instance, one can subscribe to the view that ideologies are non-deductive sets of beliefs about "right" and "wrong," and that they serve a more normative approach to life rather than provide a general framework with which to make judgements about how things work. In presenting the model below, we adopt the notion that such a framework forms the basis of making normative judgements. Put another way, we argue that while ideologies may help individuals form beliefs about what is "right" and what is "wrong," they do so within the context of some working hypotheses about their economic environment.[12]

North (1981, p. 47) best summarizes the functional role of ideologies that we shall employ below: "Ideology is an economizing device by which individuals come to terms with their environment and are provided with a 'world view' so that the decision making process is simplified. [It] is inextricably linked with moral and ethical judgments about the fairness of the world the individual perceives. This situation clearly implies a notion of possible alternatives. Individuals alter their ideological perspectives when their experiences are inconsistent with their ideology. In effect, they attempt to develop a new set of rationalizations that are a better 'fit' with their experiences."

2.2.2 Intergenerational Ideological Transmission & Education

In terms of the intergenerational transmission of ideologies (or, interchangeably, doctrines hereafter), there are equally compelling, empirically plausible and historically relevant alternatives. In this section, we shall articulate and develop two alternative mechanisms.

According to the first one, parents can indoctrinate their children with their own ideology for free (i.e., by simply being around their offspring and mainly through cultural spillovers). Or, alternatively, they can invest in some form of education (i.e., experience outside the house), $e \in [0, 1]$, which equips the offspring with the cognitive skills necessary to assess the technological and productive environment more objectively. In particular, we shall assume that "formal" and private education equips the offspring to more accurately comprehend the next period's expected level of technology, $E[G_{t+1}]$.[13] Hence, according to this formulation, we write $D_t^y = eE[G_{t+1}] + (1-e)D_t^o$, where D_t^y represents the ideological beliefs or knowledge that a young person is indoctrinated with by her parents while she is young. Note that, since we assume neither depreciation nor further investments in this stock variable when the agent is old, it follows that $D_{t+1}^o = D_t^y$.

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[12] For further details on this discussion and other considerations, see Iyigun, Mocan and Owen (2001).

[13] This is a similar formulation to Bisin and Verdier (2001), where parents invest in their children's beliefs as a form of parental altruism.

Under this formulation, the channel of indoctrination and ideological transmission is the parent/offspring relationship. And the education system, which entails private costs, provides the channel through which future workers can acquire skills that enable them to more objectively comprehend the production environment in which they will be economically active. Education may provide technical or academic skills, depending on the state of technology and the degree to which technological changes are skill biased (Goldin and Katz 1998, 2008). Importantly, however, we are not modeling education as translating into the skills or human capital required to *use* the technology. Instead, our focus is on the transformative effects of education on one's *world view* through which one comes to terms with their environment.

In our second formulation, the channel of ideological transmission is (free) public education, whereby the public education system is used to propagate a political regime's potentially self-serving and preserving ideology and political doctrines. For instance, Lott (1990) argues that public schools in the West indoctrinate students in order to instill values favorable to wealth transfers. In this formulation, parents can send their children to school for free and time spent at school helps to propagate the existing state ideologies and political doctrines. Thus, in order to escape such indoctrination, parents need to invest in a form of private education, $e^p \in [0, 1]$, which equips their offspring with the cognitive skills necessary to assess the technological and productive environment more objectively. On this basis, we write $D_t^y = e^p E[G_{t+1}] + (1 - e^p)D_t^o$, where $1 - e^p$ is the fraction of time the young spend in public school.

In both formulations, parents must invest resources in order to increase the preparedness of their children for future states of the world. In what follows, we shall solve our model according to the first formulation, although the qualitative nature of our key contentions would be operative under both mechanisms. Nevertheless, the role of education in the dynamics would be vastly different. Later in the paper, we shall revisit this issue and contrast some of the model's implications under the two mechanisms.

2.3 The Equilibrium

2.3.1 The Ruler's Problem

After observing the realization of G_t, the Ruler chooses institutions, I_t, to maximize lifetime tax revenue discounted at rate $\delta \in (0,1)$, minus the cost of maintaining institutions, $c(\cdot)$.[14] The cost of maintaining institutions is strictly increasing and convex in expenditures so that $c(0) = 0$, $c' > 0$, and $c'' > 0$. We assume there is some exogenously set tax rate, $\tau \in [0,1]$, which determines the portion of output the ruler receives.[15] The period t strategy set of the Ruler can therefore be written as $s_t^R = I_t \in \mathbb{R}^+$. The Ruler's utility is written:

$$U_t^R = \sum_{j=t}^{\infty} \delta^{j-t} E\left[\tau y_j - c(I_j) \,|\, s_j^o, s_j^R\right]. \tag{2}$$

In every period, the Ruler maximizes (2) by choosing, $\forall j \in [t, \infty]$, I_j, subject to $y_j = A_j \ell_j$ and A_j given by (1).

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[14] Recall footnote 3 and that we rule out technology non-adoption. In a setting in which political rulers or some vested interests can block new technologies, stagnation in technologies, institutions and ideologies trivially and naturally occur. Instead, our main focus is one in which technological change is the main driver of the evolution and interplay between socially prevalent ideological beliefs and political institutions.

[15] The assumption that the tax rate is exogenous is not far-fetched if the model is applied to the pre-modern setting, where rulers had weak fiscal capacity and generally extracted the maximum amount possible subject to the constraint of weak fiscal institutions. Nevertheless, one can extend our model to endogenize the tax rates although doing so would not have a qualitative material impact on our key contentions.

2.3.2 The Citizens' Problem

Simultaneous with the institutional choice of the Ruler, old agents choose levels of education (e_t) and consumption (c_t) to maximize their utility from their own consumption and the consumption possibilities of their children, subject to $e_t + c_t \leq (1 - \tau) y_t$.[16] Their choices are conditional on the ideology they formed when young (i.e., $D_t^o = D_{t-1}^y$), the prevailing institutions (I_t), and the tax rate (τ). The period t strategy set of the old agent is therefore denoted $s_t^o = (e_t, c_t) \in [0, 1] \times \mathbb{R}^+$. Old agents are altruistic, placing weight $\lambda \in \mathbb{R}^+$ on the consumption possibilities of their children (i.e., $(1 - \tau) A_{t+1}$). Assuming log utility, the utility of the old agent is written:

$$U_t^o = \log (c_t) + \lambda \log[(1 - \tau) E(A_{t+1})] . \tag{3}$$

The Citizen maximizes (3) by choosing e_t and c_t subject to $e_t + c_t \leq (1 - \tau) y_t$.

Note that, when parents' beliefs are up to date with the current production environment, $D_t^o = E[G_{t+1}]$. Consequently, $\forall\, e \in [0, 1]$, $D_t^y = D_t^o$ and parents will have no incentive to invest in education which is costly. Hence, in more predictable and stable environments where it is more likely that $D_t^o = E[G_{t+1}]$, traditional values would be passed on from one generation to the next.[17]

2.3.3 Response Functions and the Intra-Temporal Equilibrium

The intra-temporal equilibrium of such an economy is one in which each agent takes the optimal choices of the other as given and decides on her optimal allocations. This involves an intra-temporal equilibrium based on the reaction functions of the Ruler and the old agent.

Accordingly, the reaction function of the Ruler is implicitly defined by the first-order condition of the optimization problem we described above:

$$\frac{\tau \delta}{1 - \delta} \frac{\partial E(A_t)}{\partial I_t} - c'(I_t) \leqslant 0, \tag{4}$$

where

$$\frac{\partial E(A_t)}{\partial I_t} = p(1 - \alpha - \beta)(I_{t-1})^{\theta-1} \left[\alpha (G + g)^\theta + \beta (D_t^o)^\theta + (1 - \alpha - \beta)(I_{t-1})^\theta\right]^{\frac{1}{\theta}-1} \tag{5}$$

$$+ (1 - p)(1 - \alpha - \beta)(I_{t-1})^{\theta-1} \left[\alpha (G - g)^\theta + \beta (D_t^o)^\theta + (1 - \alpha - \beta)(I_{t-1})^\theta\right]^{\frac{1}{\theta}-1} .$$

And that of the old agent is implicitly based on the first-order condition of her maximization problem:

$$-\frac{1}{(1 - \tau)A_t - e_t} + \frac{p\beta\lambda (E[G_t] - D_t^o)[eE[G_t] + (1 - e) D_t^o]^{\theta-1}}{\alpha (G + g)^\theta + \beta (eE[G_t] + (1 - e) D_t^o)^\theta + (1 - \alpha - \beta)(I_t)^\theta}$$

$$+ \frac{(1 - p)\beta\lambda (E[G_t] - D_t^o)[eE[G_t] + (1 - e) D_t^o]^{\theta-1}}{\alpha (G - g)^\theta + \beta (eE[G_t] + (1 - e) D_t^o)^\theta + (1 - \alpha - \beta)(I_t)^\theta} \leqslant 0 . \tag{6}$$

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[16] Formally, the old agent chooses a level of labor, ℓ_t, to supply as well. Since we ignore utility from leisure, there is no choice but to provide labor with one's time. Thus, we drop this formality and embed the optimal labor choice into the decision problem, as a result of which we have $\ell_t = 1$.

[17] This is in line with the empirical findings of Giuliano and Nunn (2016) who show that societies tend to emphasize traditional values more in relatively stable and predictiable environments.

Taking equations (4) and (6) at strict equality, equations (4), (5), and (6) implicitly define two reaction functions, $I_t(e_t)$ and $e_t(I_t)$, that characterize the intra-temporal equilibrium of this economy, with $\overline{I}_t(\overline{e}_t)$ and $\overline{e}_t(\overline{I}_t)$ denoting an equilibrium. Given that it is impossible to derive closed form solutions for this two-equation system, we shall, in Section 2.4 below, turn to numerical simulations to demonstrate the existence of equilibrium outcomes and derive comparative statics.

2.3.4   Conservative Revivals and Progressive Ideological Beliefs

The steady state of such an economy is defined by $\Delta I_t = 0$, $\overline{e} = 0$, $I_t = \overline{I}$, and $D_t^y = D_t^o = \overline{D}$, $\forall\, t \geqslant T \geqslant 0$. Denote the pre-shock steady state ideologies and institutions as $\overline{D}_0$ and $\overline{I}_0$ and denote the post-shock steady state ideologies and institutions as $\overline{D}_1$ and $\overline{I}_1$.

Focusing on steady states allows us to address the questions raised in the introduction. When will a society fail to adopt more efficient institutions in response to changing economic conditions? And why do such conditions sometimes generate conservative ideological backlashes and, at other times, progressive social and political movements? In the context of our model, we can therefore define "conservative revivals" and "progressive movements" as follows:

Definition 1 *A **conservative revival** occurs when, following a technology shock, ideologies fail to update so that $\overline{D}_1 = \overline{D}_0$. In this case, individuals hold onto and intergenerationally propagate what worked for them in the past, despite a production environment that has changed.*

Definition 2 *A **progressive movement** occurs when, following a technology shock, ideologies and institutions are updated to match the changes in the production environment, or $\overline{D}_1 > \overline{D}_0$ and $\overline{I}_1 > \overline{I}_0$.*

We should also note here that these definitions apply in the steady state. As we shall discuss and illustrate below, conservative revivals would involve not just "holding onto" but a greater emphasis in traditional ideological beliefs (and commensurately reduced investment in education) if technology shocks hit when the economy is out of its steady state and in transition to it. By extension, progressive movements would reflect even a faster pace at which investment in education would rise in response to technological change when the economy is out of the steady state.

2.4   Numerical Simulations

In what follows, we parameterize our model and show the existence of an intra-temporal equilibrium. Then, we illustrate the steady state to which our economy would converge, given a choice of parameter values. Finally, we present a number of comparative static exercises and discuss the associated equilibrium adjustments and changes in the steady state.

In order to operationalize our model, we shall assume that the cost of institutional maintenance takes the explicit form: c^γ, $\gamma > 1$. With that, the top panel of Table 1 presents the eight parameter choices one needs to make in order to numerically solve this model. We work with a two percent time discount factor throughout ($\delta = .98$), assume some moderate degree of complementarity among the three determinants of total factor productivity ($\theta = -6$), a constant income tax rate of ten percent ($\tau = .10$), and a moderately high level of benevolence toward offspring ($\lambda = 2$). In the next panel of Table 1, we set the initial level of our two pre-shock technology variables, G and g.[18] In case I, the mean pre-shock level is high relative to the

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[18] We run numerous sensitivity checks to ensure that our results are not simply reflections of the parameters chosen. The results of these checks are reported in the Appendix.

variance, while in the remainder of the cases the pre-shock variance is greater. The bottom panel in Table 1 shows the pre-shock steady state levels of D_0^o and I_0. These are determined by the level of D_0^o in which the optimal level of $e = 0$.[19]

In Cases I and II, we compare two scenarios that only differ in the magnitude of their pre-shock technology risk, with Case II exhibiting much higher variance. In Cases III and IV, we vary the probability that TFP shocks are positive (denoted by the parameter p). For each of these cases, we investigate the post-shock, steady-state equilibrium outcomes that arise when we vary the size of the shock, ΔG, and the associated change in variance due to the shock, Δg.

In Case I, presented in the first column of Table 1, we see an initial scenario in which the level of technology, G, is much greater than its variance, g. Under such a scenario, a large shock to the level of technology, ΔG, will entail a progressive movement unless coupled with a very large shock in variance, Δg. As seen in Figure 1, there are three possible post-shock outcomes (note that the upper region is "not possible" because the variance shock cannot be so large that a negative realization of p would entail negative productivity, or $\Delta g \leq \widehat{G} - g$ so that $\widehat{G} - \widehat{g} < 0$). When the technology shock (ΔG) is large and the variance shock (Δg) is small, a progressive movement arises, meaning that both the steady-state ideologies and institutions positively update in response to shocks. This results because of the complementarities between technology, ideology, and institutions. As the technology gets better—but not commensurately riskier—the benefit to old agents of investing in investing in the education of their offspring is great enough that it outweighs the cost of foregone consumption (i.e., $e > 0$ in the period after the shock). Likewise, the benefit to the ruler of improving institutions—which increases due to better technology and ideologies commensurate with the improved technology—outweighs the increased cost associated with maintaining those institutions, $c(\cdot)$.[20]

When a more modest technology shock (ΔG) is coupled with a relatively large variance shock (Δg), a conservative revival can result. Under such a scenario, *neither* ideologies nor institutions change in response to the shock. In other words, despite improved—yet riskier—technology, the society's ideology and institutions remain what they were prior to the shock. This is the essence of a conservative revival—the society holds onto what worked for it in the past in the face of a changing world.[21]

Our model explains why this can arise. In the face of a risky new technology, risk-averse old agents are less inclined, on the margin, to invest in the education of their children, since their children's expected utility from such an investment is decreasing in Δg. Likewise, the convexity of the ruler's institutional cost curve, $c(\cdot)$, entails that expected costs from improved institutions are increasing in Δg. The key insight here is that these two phenomena interact: inferior ideologies of the old discourage investment in institutions by the ruler, which discourages investment in ideology by the old, and so on. In short, the negative interaction between ideology and institutions entails that neither update after the shock.[22]

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[19] It is true that at any level of D_0^o beneath the ones we list in the table, the optimal e would also equal 0, since the old agent would choose a corner solution. We choose to start at the highest level of D_0^o for which a steady state exists.

[20] We split the "progressive movement" section of the figure into shocks which unambiguously improve the technology and those where improvement is ambiguous. Unambiguous improvement simply entails that a positive outcome—i.e., $\widehat{G} - \widehat{g}$ - is greater than a negative outcome was prior to the shock, i.e., $G + g$. It is not surprising that ideologies and institutions improve following a shock that unambiguously improves technology. When the technological improvement is ambiguous, meaning that $\widehat{G} - \widehat{g} < G + g$, a progressive movement can still arise when the shock to variance, Δg, is sufficiently small.

[21] Recall here how conservative revivals would differ based on whether or not the economy was in its steady state when it was exposed to technological change.

[22] Figure 1 also reveals a small part of the parameter space in which ideologies modestly update but institutions regress following the shock. We do not focus much on this intermediate case because it is does not yield clear testable predictions and because the space over which it is an equilibrium is small. Yet, it is useful to provide some intuition for the existence of this space. Under certain sets of parameters, when shocks are of a magnitude such that ideologies update modestly following a shock, the increase in both the level of technology and the modest increase in ideology do not provide enough incentive for the ruler to upgrade institutional capacity relative to the increase in marginal cost associated with riskier technology. In such a situation, the ruler prefers to let institutions decay in order to diminish his exposure to risk. As the risk level falls, the complementarities

In our next three numerical exercises, shown in Columns 2 through 4 of Table 1, we explore the impact of a higher initial variance in technology, g. The exercise in Column 2 holds all other parameters constant, while the exercises in Columns 3 and 4 vary p, the probability that the shock is positive. The equilibrium spaces for each of these three cases are represented graphically in Figures 2, 4, and 5. The general shape of each of these figures looks the same as in Figure 1, so we will not elaborate on the intuition underlying them. However, it is worth commenting on the differences between the figures.

Figure 2 reveals that, for any given incremental increase in the level of technology, ΔG, a conservative revival arises for smaller incremental increases in Δg when the initial variance in technology, g, is already large. Put differently, the "ideological transition frontier", which separates the zone of conservative revivals from progressive movements, has a significantly smaller slope in Figure 2 than it does in Figure 1. This is made clear in Figure 3, which maps the ideological transition frontier for Cases I and II. Consequently, it takes a smaller uptick in the riskiness of any technological improvement for new technologies to induce conservative backlashes. Furthermore, this is also driven in part by the fact that the initial ideology stock and institutions are lower as well due to the higher degree of risk inherent in Case II (see Table 1).

Moving onto Case III, where the probability of a positive shock is increased to $p = 0.60$, but all other parameters are the same as in Case II, it is clear that a conservative revival happens over only a small part of the parameter space. This case is represented in Figure 4. The intuition is straight-forward: the higher that p is, the greater the expected value of technology in the future. Since technology is complementary to ideology and institutions, there is more incentive for old agents to invest in education, e, when p is large. This logic also explains the equilibrium outcomes in Case IV, represented in Figure 5, in which $p = 0.40$. Since p is smaller than in any of the other cases, it follows that the space over which a conservative revival occurs is greater.

Finally, we consider what happens when the shock occurs when the economy is out of the steady state (and on the transition to it). We do not report simulation results,[23] but instead provide intuition. On the transition to the steady state, e is positive since the transition involves positive education levels until the returns to education have diminished to the point where $e = 0$. Anticipating greater beliefs in the future, the ruler chooses a higher level of institutions than he would in a one-shot game. This entails that it takes a larger Δg for a conservative revival to occur than when the shock hits an economy in its steady state, holding all other variables constant including ΔG. The logic is straight-forward. Since old agents were going to invest in e prior to the shock anyways, it takes a larger change in the variance of production to discourage further investment in education. However, when a conservative revival does occur, it is associated with a larger institutional regression than in the case where the shock hits in the steady state. The intuition is that, prior to the shock, the ruler chose a level of institutions that took into account the future increase in beliefs—and therefore the better production environment. If Δg is large enough that old agents reduce their investment in education, not only will the ruler scale back his investment in institutions due to the increased variance in production, he will also scale back investment due to there being no future positive feedback between institutions and education.

2.5   Comparative Statics

We are interested in how steady-state institutions and ideologies respond to technology shocks (ΔG) and their associated variance shocks (Δg). We therefore derive comparative statics with respect to these two

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between technology, ideology, and institutions are strong enough to incentivize the ruler to positively update institutions.

[23] Simulation results are available upon request.

parameters.

First, consider how institutions and ideologies respond to a positive technology shock (ΔG). Such a shock increases the benefit for old agents of investing in education (e), since the returns for their children are greater. It also increases the benefit for the ruler of investing in better institutions, since the return from institutions is greater. These claims are readily apparent in Figures 1 through 5 (and in the underlying numerical examples shown in Table 1)..

Next, consider how steady-state institutions and ideologies respond to the variance shock (Δg) associated with the technology shock. Since agents are risk-averse, an increase in risk decreases the benefit to one's children of investing in education (e). Hence, an increase in risk also decreases the benefit of institutional change for the ruler. Again, these assertions were made apparent in Figures 1 through 5 (and the underlying numerical cases of I through IV).

3 Historical Evidence

In this section, we support the insights of the model with three analytical narratives of important episodes in world political and economic history. These are, namely, (a) the long-run history of the Ottoman Empire's evolving political and institutional response to modernize and cope with a rapidly industrializing Europe, (b) the inward turn of Qing China during the Tongzhi Restoration, and (c) the rapid industrialization and modernization of the Japanese economy during the Meiji era.

3.1 The Ottoman Empire[24]

It was by no means obvious in the 16th century that the Ottoman Empire would eventually fall behind its Western European rivals. Territorially, the Empire expanded throughout the century and eventually ruled most of the North African coast, the Arabian Peninsula, the Balkan Peninsula, and most of the Middle East. Indeed, the Ottomans repeatedly threatened the great powers of central and southern Europe—Spain, Venice, and the Holy Roman Empire.

Yet, by the end of the 17th century, the Ottomans had clearly fallen behind. Even prior to the Industrial Revolution, this reversal of fortune was especially apparent with respect to technology (Mokyr 1990). Our model is well suited to explain the Ottoman reaction to European economic and technological advancements. The Ottomans were hardly unaware that the tables began to turn in the seventeenth century; they were in close contact with the West when profound economic changes were beginning to take shape in Europe. As early as the first part of the seventeenth century, the Ottomans seem to have caught on rather quickly that the world was rapidly changing. The prototype reformist sultan was Osman II, whose reign lasted from 1618 to 1622. He was followed by Sultan Murad IV (r. 1623–40) and the exceptional era of Grand Vizier Mehmed Köprülü (r. 1656–83), who both followed up with reforms of their own.

In our model, technological changes, ΔG, entail improved institutions to accommodate such changes if and only if the uncertainty associated with such technology, Δg, is not too large. When uncertainty is large, beliefs about the appropriateness of the technology to the society's resource base will not update, and there will be little incentive for the ruling elite to update institutions. The latter insight provides an explanation for the Ottomans reaction to Western advancements and, in particular, why the early reformist sultans advocated conservative reforms. These Ottoman rulers clearly recognized that change was occurring

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[24]Many of the insights laid out in this section are spelled out in Iyigun (2015, pp. 170-3).

in the West, but their operating premise was the inferiority of anything Western, and their instincts typically involved a stronger emphasis on the Muslim-Ottoman fundamentals. Shaw (1976, p. 175) labels this initial wave of reforms as the traditionalistic reform period:

> It is erroneous to believe that the ruling class faced the internal decline without making any efforts to remedy the situation. There were reformers and reforms at crucial times during the seventeenth and eighteenth centuries. But even the most intelligent and perceptive of Ottoman reformers at this time adhered to the basic premise that the Ottoman system was far superior to anything that the infidel might develop, an attitude that had considerable justification only when it first evolved in the sixteenth century. According to this idea, the reason for Ottoman decline was a failure to apply the techniques and forms of organization that had achieved success at the peak of Ottoman power, normally equated with the reign of Süleyman the Magnificent. To the traditionalistic reformers of the seventeenth and eighteenth centuries, then, reform could be achieved by making the system work as it had previously.

Indeed, an entire class of Ottoman political observers writing in the sixteenth through eighteenth centuries commented on the "decline" of the empire. One of the first of these writers was Mustafa Ali (1541-1600), who wrote a history of the empire during a time of Ottoman expansion—i.e., before it was obvious that the empire had fallen behind leading European powers. Ali's treatise is characteristic of what would become the "decline genre," which focused on deviations from the norms of Süleyman's reign (Howard 1988; Dale 2010). Ali's history laments the "rising corruption, disruption of the military, the declining power of viziers, the loss of authority of the madrasa-trained intellectual elite, ... economic problems, and the pernicious influence of the harem" (Dale 2010, p. 270). If the sultan and his administrators could just return to the pious and honest rule of Süleyman (and his predecessors), Ottoman decline would be arrested.

Along these same lines, Lewis (2002, p. 45) notes how traditional Ottoman reforms emphasized a return to cultural and ideological roots: "The final answers given by traditional writers to the older formulation of the question [why did the West leap ahead?] were always 'let us go back to our roots, to the good old ways, to the true faith, to the word of the God.' With that of course there was always the assumption that if things are going badly, we were being punished by God for having abandoned the true path."

The most important and skilled writer on Ottoman stagnation was Koçi Beg, an intimate advisor of Sultan Murad IV (r. 1623-40), who wrote a treatise for Murad in 1630 and a description of Ottoman institutions and terminology for Sultan Ibrahim in 1640 (Howard 1988, p. 64; Lewis 1973, p. 203-7). Throughout his writings—many of which were used extensively by later writers of the genre—the concept of a past "Golden Age" under Süleyman is a dominant theme (or, the "imagined perfection" of the era before Süleyman, as denoted by Colin Imber [2016]). It was under Süleyman that administrative practices reached their ideal, but this ideal was long past: "It is a long time since the high-chambered household of the lofty Sultanate (may it remain under the protection of eternal grace) was served by solicitous, well-intentioned, worthy ulema and by obedient, self-effacing, willing slaves. Today the state of affairs having changed, and evil, upheaval, sedition, and dissension having passed all bounds, I have sought occasion to observe the causes and reasons of these changes, and bring them to the Imperial and august ear" (quoted in Lewis 1973, p. 203). It was the laziness of the sultan, the debasement of the Grand Vizier, the bloating of the Janisseries, and the venality of the judges—all practices far removed from the glories of the "imagined perfection" of the past—that were at fault for Ottoman decline (Lewis 1973, p. 204-6). Koçi Beg's writings were characteristic of the entire genre,[25] having an "essentially conservative or backward-looking perspective" (Dale 2010, p.

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[25] For instance, an anonymous treatise entitled *Kitāb-i Müstetāb* from about 1620 argues that the Ottomans were so successful

272). Yet these writings were also optimistic, noting that a return to the past—a "conservative revival" to use our terminology—was all that was needed to bring back lost glory: "The enemies of the faith, seeing the good order and stability ... will say, in helpless fear and envy: 'The House of Osman lay for sixty years in neglectful sleep, but now they are wide-awake, and have begun to make good the shortcomings of past days'" (quoted in Lewis 1973, p. 207).

Simply put, it was not obvious to the Ottomans of the time that European institutions were superior to Ottoman ones, particularly those put in place during the Ottoman rise to power. This was a period of rapid change in Europe, and while European institutions worked well in the European context, they clashed with the belief of Ottoman superiority. Indeed, if it were just a matter of transplanting institutions independent of beliefs, this would have been straight-forward enough. But beliefs about the inferiority of Ottoman institutions were slow to update. In the process, Ottoman institutions fell behind. This is a classic case of what we describe in the model as a "conservative revival." In the face of a vastly changing, yet uncertain, world, Ottoman beliefs in their own superiority failed to change and, as a consequence, Ottoman institutions failed to accommodate the technological advances.

The failure of the *tımar* system provides an excellent example of the interaction between antiquated institutions and conservative ideological beliefs. At the height of Ottoman power in the fifteenth and early sixteenth centuries, the sultan derived two-thirds to three quarters of his revenue through the *tımar* system, a military lease contract whereby the provincial cavalry collected agricultural taxes directly from the peasantry as remuneration for their military services to the state. The *tımar* system was similar to the tax collection system of feudal Europe, where local feudal lords controlled revenues in return for military service. But as Ottoman expansion ceased and the sultan was no longer able to provide new *tımar*s to the military elite, the system began to fail and the central government received less tax revenue (İnalcık 1973, ch. 13; Hourani 1991, ch.13; Coşgel and Miceli 2005). To address this revenue shortfall, the state eventually (in 1695) sought larger short-term payouts in return for lifetime tax farms under an institution known as the *malikane* system. But this system failed, too, as tax farmers passed down their farms to their heirs instead of returning them to the state, and some tax farmers stopped sending in revenues altogether (Pamuk 2004; Balla and Johnson 2009).

The Ottoman failure to extract revenue stands in stark contrast to what the leading European economies were able to achieve. The sixteenth and seventeenth centuries were precisely the period when the leading European powers built large fiscal apparatuses and sovereign debt markets. They achieved this via institutions that constrained rulers and centralized tax collection (North and Weingast 1989; Dincecco 2009). As a result, a nation as small as the Dutch Republic was able to collect 42.5% more taxes than the Ottoman Empire by the 1650s despite having less than one tenth of its population. In per capita terms, the Dutch collected over 15 times the revenue of the Ottomans, and the Spanish, French, Venetians, and English all collected at least five times the per-capita revenue of the Ottomans (Karaman and Pamuk 2010, 2013).

How did Ottoman advisors and intellectuals respond to the decline of the *tımar* system? Instead of looking to Europe for solutions—and clearly certain European polities had found better institutional solutions to tax collection—Ottoman writers placed blame on corruption within the *tımar* system. If only the Ottomans could employ the system like it was used at the height of Ottoman power under Süleyman (and before), decline could be arrested. It was corruption and nepotism among *tımar* holders, not the *tımar* institution

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from the founding of the dynasty until the reign of Murād III (1574-1595) because they followed Shari'a (Islamic law) and kanun (secular law) and had just administration. The author contrasts that situation with the present, where decline versus the West had already commenced (Howard 1988, p. 71). For many more examples, see Lewis (1973, ch. 15), Howard (1988), and Dale (2010, p. 270-287).

itself, that required amending (Howard 1988, pp. 59-73).

It was only after the Ottoman-Europe disparity became sufficiently salient that the Ottomans accepted the superiority of European institutions and technology. Historians date the beginning of the Ottomans' decline to the Peace of Karlowitz signed between the Holy League and the Ottomans in 1699. With that treaty, the Ottomans ceded most of Hungary, Transylvania, and Slovenia to Austria; Podolia to Poland; and most of Dalmatia to Venice. According to Shaw (1976, p. 225), Karlowitz also marked the ushering in of the second-generation Ottoman reforms:

> The loss of territories long considered integral parts of the empire also shook Ottoman morale to the point where, to many people, any kind of effort to save the empire seemed impossible. For the first time a few Ottomans began to see that reform was possible if only the empire could discover what Europe had done to achieve its new supremacy and incorporate what was best into the Ottoman system. Reformers now began to accept the possibility that Europe might have developed certain specific techniques that might be used to strengthen and preserve the traditional ways, particularly new forms of military organization and weapons. Traditionalistic reform, therefore, became a combination of old and new, creating an amalgam that, while not successful in itself, opened the way for a new style of modern reform during the nineteenth century.

Shaw's astute observation highlights two critical elements that speak volumes about how beliefs came to bear on Ottoman economic calcification. First, only when the Ottoman Empire's inferiority became exposed with successive territorial losses against the Habsburgs was there a painful recognition that perhaps studying the ways of the Christian West—and not discounting them due to long-held beliefs regarding its culture and capabilities—was central to successful reforms. From the perspective of our model, this is akin to acknowledging that ΔG inherent in Western technologies and practices was actually significantly large (as opposed to assuming nothing significantly improved in terms of G could originate in the West). As a clear indication of how difficult it must have been to shed those old assumptions and beliefs regarding the status of the West vis-á-vis dar-al-Islam, the reformer Sultans had to consult the ulemá (doctors of the Holy Law) for them to authorize two changes in the conduct of state affairs: "The first was to accept infidel teachers and give them Muslim pupils, an innovation of staggering magnitude in a civilization that for more than a millennium had been accustomed to despise the outer infidels and barbarians as having nothing of any value to contribute ... The second was to accept infidel allies in their wars against other infidels." (Lewis 2002, pp. 21-22).

Second, there was an attempt to keep technology and ideology transfers confined to the military and national defense realms. Lewis (2002, p. 81) makes the case for this point about Islam vis-à-vis Christianity in general: "The relationship between Christendom and Islam in the sciences was now reversed. Those who had been disciples now became teachers; those who had been masters became pupils, often reluctant and resentful pupils. They were willing enough to accept the products of infidel science in warfare and medicine, where they could make the difference between victory and defeat, between life and death. But the underlying philosophy and the sociopolitical context of these scientific achievements proved more difficult to accept or even to recognize." The fact that military reforms took precedence over others helped subordinate the hurdles of cultural and religious beliefs, but it did not ensure the successful implementation of even the necessary reforms, as the empire was slow to adapt and it held the view that the fundamentals of its own military organization were superior to the West (Imber 2002, p. 284).

It was not until the 19th century unveiling of the Tanzimat Decree by Sultan Abdul Mecid (1839) that the Ottomans began to adopt Western institutions. The Tanzimat was the earliest constitutional document in any Islamic country and culminated with the establishment of the first ever House of Parliament in the Muslim world, the Meclisi Mebusan, in 1876 (Kinross, 1979, p. 474). But these reforms came too late. By the late 19th century, the Ottoman Empire was known as the "sick man of Europe", and its remnants were carved up by the victors of the First World War. What was a once powerful empire fell behind and could not catch up–not because it was incapable of adopting Western institutions, but because the beliefs of its people were incompatible with the adoption of Western techniques.

3.2   Qing China

The case of Qing China (1644-1912) presents a particularly illuminating example of a "conservative revival" in response to foreign technological and institutional innovations. Prior to the Qing, it was not obvious that the West had pulled ahead economically and technologically. Indeed, prior to the fifteenth century, China far surpassed Europe in technological capability. In this period, the transfer of technologies overwhelmingly flowed from East to West—inventions such as paper, the compass, printing, gunpowder, iron plow, blast furnace, water clock, crossbow, and trebuchet were made in China centuries before their adoption in Europe (Mokyr 1990). However, by the dawn of the sixteenth century, numerous Western European technologies surpassed that of China. Indeed, Mokyr (1990, p. 209) argues that "the greatest enigma in the history of technology is the failure of China to sustain its technological supremacy." Chinese time-measuring technologies, ocean shipping, and block printing (as opposed to movable type) are examples of technologies in which China had reigned supreme for centuries but fell behind Europe by 1500 CE. In spite of China's head start in knowledge of explosives, European military technology was far superior to anything found in China by the dawn of the sixteenth century (Needham 1986). When the Portuguese reached China's shores in 1514, the superiority of European muskets and cannons was apparent to all, and the Chinese rapidly adopted these weapons (Cipolla 1965; Hacker 1977).

Like the Ottomans, the Ming (1368-1644) and Qing were quick to see the benefits of European military technology. Indeed, in the sixteenth century, the Ming adopted much of what the West offered. However, also like the Ottomans, the Chinese adoption of Western techniques was largely confined to military innovations and weaponry, not economic or fiscal institutions. Even in the case of military technologies, the Qing emperors imposed severe limits on trade with the West. For example, the flintlock musket completely displaced previous types of muskets in Europe by 1725, but, as Needham (1986, p. 465) notes, "there seems to have been no flintlock period [in China] . . . because of military conservatism." Moreover, numerous Western observers noted that, as late as 1850, the Chinese were using sixteenth-century weaponry—gunpowder weapons were limited to matchlocks and cannons that were similar to sixteenth and seventeenth century European models. Meanwhile, European military technology had advanced rapidly, and by mid-century technologies included caplock rifled muskets and shell guns (Hacker 1977). It was not until the mid-nineteenth century that China modernized its military technology, rapidly accepting Western technological advances in the face of the Taiping Rebellion (1851-1864) (Needham 1986; Mokyr 1990).

It was in the face of two contemporaneous crises—the rapid decimation of Chinese forces by the British in the First Opium War (1839-42) and numerous internal revolts, with the Taiping Rebellion being the most bloody and dangerous to the regime's future—that the Qing realized the need to modernize their economy and military. Revenues were too low to contain further rebellion (Ma and Rubin 2016), while the Qing faced an existential crisis of European domination that was temporarily relieved by their acquiescing to humiliating

trade deals that gave Westerners extraordinary commercial powers within China. The adoption of Western institutions would have offered a solution to China's relative stagnation; politically constrained rulers, like those of the leading European powers, could have raised much more tax revenue, while opening up markets and reducing arbitrary powers of government officials would have encouraged the adoption of techniques and technologies. It was unquestionable that Western economic and political institutions were more efficient than Chinese ones by the mid-19th century.

In the terms of our model, the potential ΔG available to the Qing was large if institutions more commensurate with the improved technologies were adopted. But it was also highly uncertain how such institutions would interact with previously established Chinese institutions—ones that had served generations of Chinese rulers very well in the past. The most important of these institutions was the bureaucracy, with its grounding in Confucian ideals. Bureaucrats were the primary tax collectors, dispensors of law and order, chief instruments of peasantry control, and legitimizers of the state. The bureaucracy was by nature a conservative group, as it was tasked with providing stability rather than technological or economic improvement (Fei 1953; Wright 1957, p. 60-63; Chesneaux and Needham 1964, p. 593; Cipolla 1965; Mokyr 1990, p. 235-37). Indeed, the ideal Confucian political system was based on an ethic of "enduring value, true and right for all men in all ages" (Wright 1957, p. 2)—precisely the type of conservatism we have in mind in our description of a "conservative revival." Would the adoption of Western institutions undermine the traditional bureaucracy? If it did, would this in turn undermine the foundations of the Qing state? Wright (1957, p. 174-5) thinks this is likely: "[Qing] leaders were as little interested in modernizing the Chinese economy as they were in encouraging the commercial elements in the traditional economy. Their aim was the restoration of the old order, and they were intelligent enough to see that most of the new Western techniques for speeding production and distribution and increasing consumption were certain to disturb its stability." In the terms of model, the variance (or uncertainty) of institutional adoption, Δg, was large. In such a setting, our model predicts that a conservative revival may arise.

The Qing responded to these crises with a set of policies known as the "Tongzhi Restoration" (1862-74), a period in which modernizing policies were enacted. However, these policies were implemented via the old, conservative bureaucratic institutions, led by scholars steeped in conservative Confucian ideology (Wright 1957). Instead of adopting Western governance, fiscal, or tax-collecting institutions, the Qing attempted to apply practical or rational Western knowledge without adopting the Western institutions that made this knowledge useful in the first place. According to Wright (1957, p. 63), "Restoration statesmen had no desire to create a new society. They wanted to restore a society that they confidently believed had been based on immutable truth and that could therefore, with adjustments, flourish in any age." For example, in order to deal with diplomacy with the European powers, the Qing government simply grafted a modern foreign relation office onto the bureaucracy, rather than removing the bureaucracy from foreign relations altogether (Wright 1957, p. 8).[26] Hence, instead of seeking knowledge of the technological revolution occurring in Europe, the Chinese elites remained engrossed in preparing for the civil service exams based on knowledge of Chinese classics (Ma 2004). This "borrowing" of Western knowledge but not institutions is summarized nicely by Wright (1957, p. 1):

> Chinese conservatism, ... aimed at the preservation of the Confucian, rationalist, gentry, and nonfeudal strains of pre-Taiping and pre-Opium War Chinese society. Chinese conservatives, unlike Chinese radicals, have not been interested in Western political or philosophical ideas.

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[26] It should be noted that the introduction of a modern foreign relations office was one of the most successful endeavors of the era, as it resulted in numerous accomplished diplomats and better foreign relations for China (Wright 1957, p. 8).

When they have been interested in the West at all, their interest has been solely in terms of the famous formula: 'Chineses learning as the basis; Western learning for practical use.'

The implication of the lack of institutional change was that those in power to set and implement laws and policies—the bureaucracy—had a vested interest in maintaining the status quo and their place within the imperial system. They implemented the so-called "Self-Strengthening Movement", which discouraged private enterprise, disparaged commerce and foreign trade, emphasized agriculture above all other forms of economic activity, encouraged frugality, and discouraged investment in infrastructure in favor of "traditional" handicrafts (Wright 1957, ch. 8-9). Indeed, private modern industry had no legal status in China until the 20th century (Brown 1979; Ma 2004). These policies in turn resulted in the loss of leadership in one of China's most important industries, sericulture (silk production) to Japan, whose Meiji government implemented Western reforms strongly encouraging private enterprise (despite its negative effects on traditional manufacturers) and important infrastructure such as the telegraph (Ma 2005). As Ma (2004, p. 374) notes, "the attitude of the Self-Strengthening Movement toward private initiatives in the modern sector ranged from indifference to hostility and displayed little interest in supplying modern public goods: in most cases, this movement was even opposed to private efforts to build public infrastructure such as railroads and inland steam shipping."

The Qing responses to Western advancement and its own internal troubles is a particularly straightforward example of what we mean by a society undergoing a "conservative revival". In the face of a rapidly changing world—indeed, a world that was obviously much more efficient than the world of previous Chinese glory—the Qing refrained from adopting the institutions that were responsible for Western economic success. The uncertainty related to how Western institutions, ideologies, and technologies would interact with the prevailing Chinese institutions and ideological beliefs, both of which were steeped in a Confucian ethic that was often inconsistent with Western ideals, discouraged the Qing from adopting Western advancements despite very clear evidence that they were more efficient. It was only after China's failure to modernize became all the more obvious during the Sino-Japanese War (1894-95) that the failure of the empire's bureaucrats and leaders to grasp the obvious became inevitable: China had fallen behind. After all, the Westernizing Meiji reforms that Japan had recently undertaken had clearly enabled their humiliating victory over China (see the next section for more on Meiji Japan). In this context, the Chinese finally considered major institutional changes. By then, however, it was too late; the Qing dynasty was on its last legs and would collapse by 1912.

3.3   The Meiji Restoration

Forthcoming.

4   Dynamics with Public Education as the Indoctrination Medium

Thus, far, we assumed that the ideological intergenerational transmission mechanism was time spent between the parent and the child outside of school. In what follows, we consider an alternative version of our model where, as we discussed earlier, public education is the channel of ideological transmission intergenerationally. In particular, we explore two versions of this model. In the first version, the ruler supplies public education in each period to meet demand, with the latter being based on the optimization problem of citizens. In the second version, the ruler chooses and mandates the minimum level of public education as well, based on his maximization problem. Recall from subsection 2.2.2, however, that in both of these versions, we

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have a slightly amended intergenerational ideological transmission process that yields $D_t^y = e^p E[G_{t+1}] + (1 - e^p)D_t^o$, where $1 - e^p \equiv e^\pi$ is the fraction of time the young spend in public school. In words, in order to equip their children with ideological beliefs potentially more in line with the existing state of technologies, parents now have to undertake costly investment in the education of their offspring beyond the schooling offered publicly for free.

4.1 Without Minimum Education Laws

In this case, the old agents' problem is unaltered save for the fact that the intergenerational transmission process is altered as we just described. By contrast, the Ruler now takes into account the choices of his citizens and ensures that the public supply of education meets the demand. In essence, we now have the Ruler's utility as the following:

$$U_t^R = \sum_{j=t}^{\infty} \delta^{j-t} E\left[\tau y_j - c(I_j) - \widehat{c}(e^\pi)|s_j^o, s_j^R\right] \ , \tag{7}$$

where the cost of public education supply is strictly increasing and convex in expenditures so that $\widehat{c}(0) = 0$, $\widehat{c}' > 0$, and $\widehat{c}'' > 0$. As before, there is some exogenously set tax rate, $\tau \in [0,1]$, which determines the fraction of output the ruler receives. In this version of our model, the ruler does not choose the supply of public education optimally based on his preferences, but purely to meet the demand that arises due to the citizen's optimal choices. Hence, the period t strategy set of the Ruler can still be written as $s_t^R = I_t \in \mathbb{R}^+$, with e^π chosen by the ruler such that $1 - e^p = e^\pi$ and where e^p is the optimal solution to the old agents' problem.

The rest of the analysis in this case goes through as in our original formulation with equations (4), (5), and (6) once again defining two reaction functions, $I_t(e_t)$ and $e_t(I_t)$, that characterize the intratemporal equilibrium of this economy, with $\overline{I}_t(\overline{e}_t)$ and $\overline{e}_t(\overline{I}_t)$ denoting an equilibrium. Thus, the comparative statics will also be identical to the cases we discussed above, with one major distinction: when the ideological transmission mechanism is primarily public education, conservative revivals will be positively associated with increased formal schooling, and progressive movements would entail reduced demand for public education.

4.2 With Minimum Education Laws

When the public education decision is also independently made by the Ruler as an outcome of his optimization problem, he institutes and enforces minimum education laws in order to achieve full compliance by the citizens. In this case, old agents maximize their utility as before with the additional constraint that their optimal private education level, e^p, would have to be in compliance with mandatory minimum education levels. Letting $e_{\min}^\pi$ denote the Ruler's chosen level of optimal minimum education, this implies that the citizens face the added constraint $1 - e^p \geqslant e_{\min}^\pi$.

In this version of the model, the Ruler still maximizes

$$U_t^R = \sum_{j=t}^{\infty} \delta^{j-t} E\left[\tau y_j - c(I_j) - \widehat{c}(e_{\min}^\pi)|s_j^o, s_j^R\right] \ , \tag{8}$$

although he now also chooses the supply of public education optimally based on his preferences. Hence, the period t strategy set of the Ruler is now written as $s_t^R = I_t, e_{\min}^\pi \in \mathbb{R}^+$.

When the minimum education constraint isn't binding on the Citizens, then equation (6) is satisfied as a strict equality at the optimal choice of e^p such that $1 - e^p \geqslant e^\pi_{\min}$. In that case, the model goes through in a qualitatively and quantitatively similar way with the extension immediately above. That is, conservative revivals would occur when, from the perspective of the citizens, the risks of new technologies outweigh their potential benefits. As well, conservative revivals would be positively associated with increased formal schooling, whereas progressive movements would entail less public education.

The more interesting case in this extension unfolds when the minimum schooling laws strictly bind the citizens' choices. In that case, equation (6) is satisfied only as a strict inequality and both I_t and e^p_t (due to the fact that it will have to satisfy $e^\pi_{\min}$) are determined by the Ruler according to this preferences and optimal choices. And they respectively satisfy equations (4) (given (5)) and the following:

$$\frac{\tau \delta}{1 - \delta} \frac{\partial E(A_t)}{\partial e^\pi_{\min}} - \widehat{c}'(I_t) \leqslant 0, \tag{9}$$

where

$$\frac{\partial E(A_t)}{\partial e^\pi_{\min}} = p\beta[D_t^o - E(G_t)]^{\theta-1}\left[\alpha\left(G+g\right)^\theta + \beta\left(D_t^o\right)^\theta + (1-\alpha-\beta)\left(I_{t-1}\right)^\theta\right]^{\frac{1}{\theta}-1} \tag{10}$$

$$+(1-p)\beta[D_t^o - E(G_t)]^{\theta-1}\left[\alpha\left(G-g\right)^\theta + \beta\left(D_t^o\right)^\theta + (1-\alpha-\beta)\left(I_{t-1}\right)^\theta\right]^{\frac{1}{\theta}-1}.$$

Note that the Ruler is risk neutral while the Citizens are not. In addition, the Ruler has an infinite time horizon whereas the citizens consider only one period ahead (and the latter only because they are benevolent toward their offspring). Consequently, the Ruler would put more emphasis on the transmission of existing ideologies through higher levels of mandatory public education *only if* the technology shocks reduce mean TFP.

In essence, when the mandatory public education laws bind the choice of the citizenry, conservative revivals are less likely to occur because the Ruler is risk neutral. Nevertheless, when conservative revivals do occur in this case, which takes place only when the mean TFP declines due to the technology shocks, they will tend to be more intense. The reason for this is that the Ruler has an infinite time horizon and puts more weight on the future than the citizens. Hence, when conservatism and a higher emphasis on the intergenerational transmission of existing ideologies pay off, the Ruler would choose a greater level of emphasis on public education and intergenerational indoctrination than what would be chosen by the citizens themselves.

5   Conclusion

In this paper, we propose a theoretical framework that seeks to explain why institutional reforms by themselves have historically not been the elixir of economic development. Instead, we emphasize the role of ideological beliefs in economic development, in particular, the interplay between new technologies, ideologies, and institutions.

According to our model, new technologies entail both risk and reward. When the risks of new technologies and uncertainties inherent in them dominate during times of rapid technological change, they can generate a conservative ideological backlash that puts a higher premium on traditional beliefs and values. In that case,

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we show that institutions would stagnate as well. Only when the superiority of new technologies outweighs their inherent risks does the pace of institutional change accelerate in conjunction with a more progressive ideology that deemphasizes traditional beliefs.

We then visit three historical episodes—the Ottoman reform initiatives, the Tongzhi Restoration in Qing China, and the Japanese Meiji Restoration—which all illustrate how the interplay between ideologies and institutional adaptation in the face of rapid technological progress influenced long-run economic outcomes. In all three cases, we show how the societies' long-standing beliefs and ideologies were impediments to meaningful institutional reforms and how, when these societies were exposed to more sophisticated and advanced technologies with their inherent perceived risks, early reform attempts were fundamentally conservative in nature. And in all of these cases, we discuss how progressive and more wholesale institutional reforms came on the back of clear evidence for the superiority of the technological advances.

References

Acemoglu, Daron, and Matthew O. Jackson. 2016. "Social Norms and the Enforcement of Laws." *Journal of the European Economic Association.* Forthcoming.

Acemoglu, Daron, and James A. Robinson. 2000. "Political Losers as a Barrier to Economic Development." *American Economic Review* 90: 126–130.

Acemoglu, Daron, and James A. Robinson. 2006. "Economic Backwardness in Political Perspective," *American Political Science Review* 100: 115–131.

Alesina, Alberto and Paola Giuliano. 2015. "Culture and Institutions." *Journal of Economic Literature* 53(4): 898-944.

Alesina Alberto, Giuliano Paola, and Nunn Nathan. 2013. "On the Origins of Gender Roles: Women and the Plough." *Quarterly Journal of Economics.* 128(2): 469-530.

Algan, Yann and Pierre Cahuc. 2013. "Trust and Human Development: Overview and Policy Implications." in Handbook of Economic Growth, Philippe Aghion and Steven N Durlauf (Eds.). Vol. 1A.

Balla, Eliana and Noel D. Johnson. 2009. "Fiscal Crisis and Institutional Change in the Ottoman Empire and France." *Journal of Economic History* 69(3): 809-45.

Becker, Sascha O., Katrin Boeckh, Christa Hainz, and Ludger Woessmann. 2016. "The Empire is Dead, Long Live the Empire! Long-Run Persistence of Trust and Corruption in the Bureaucracy." *Economic Journal* 126(590): 40-74.

Bisin, Alberto, and Thierry Verdier. 2001. "The Economics of Cultural Transmission and the Dynamics of Preferences." *Journal of Economic Theory* 97: 298-319.

Bisin, Alberto, and Thierry Verdier. 2015. "On the Joint Evolution of Culture and Institutions." Working Paper.

Brown, Shannon R. 1979. "The Ewo Filature: A Study in the Transfer of Technology to China in the 19th Century." *Technology and Culture* 20(3): 550-68.

Buggle, Johannes. 2016. "Law and Social Capital: Evidence from the Cod Napoleon in Germany." *European Economic Review* 87: 148-175.

Chaudhry, Azam, and Phillip Garner. 2006. "Political Competition between Countries and Economic Growth." *Review of Development Economics* 10: 666–682.

Chesneaux, Jean and Joseph Needham. 1964. "Science in the Far East from the 16th to the 18th Century." In: *The Beginnings of Modern Science: From 1450 to 1850*, René Taton (Ed.). New York: Basic Books.

Cipolla, Carlo M. 1965. *Guns, Sails, and Empires: Technological Innovation and the Early Phases of European Expansion 1400-1700.* New York: Pantheon.

Coşgel, Metin M. and Thomas J. Miceli. 2005. "Risk, Transaction Costs, and Government Finance: The Distribution of Tax Revenue in the Ottoman Empire." *Journal of Economic History* 65(3): 806-21.

Coşgel, Metin M.; Thomas J. Miceli and Jared Rubin. 2012. "The Political Economy of Mass Printing: Legitimacy, Revolt, and Technology Change in the Ottoman Empire." *Journal of Comparative Economics* 40(3): 357-371.

Dale, Stephen F. 2010. *The Muslim Empires of the Ottomans, Safavids, and Mughals*. Cambridge: Cambridge University Press.

Dincecco, Mark. 2009. "Fiscal Centralization, Limited Government, and Public Revenues in Europe." *Journal of Economic History* 69(1): 48-103.

Fei, Hsiao-Tung. 1953. *China's Gentry: Essays in Rural-Urban Relations*. Chicago: University of Chicago Press.

Gershman, Boris. 2016. "Long-Run Development and the New Cultural Economics." Working Paper.

Giuliano, Paola. 2007. "Living Arrangements in Western Europe: Does Cultural Origin Matter?" *Journal of the European Economic Association* 5(5): 927–52.

Giuliano, Paola and Nathan Nunn. 2016. "Understanding Cultural Persistence and Change." Harvard Universtity, mimeo.

Goldin, Claudia, and Lawrence F. Katz. 1998. "The Origins of Technology-Skill Complementarity." *Quarterly Journal of Economics* 113(3): 693-732.

Goldin, Claudia, and Lawrence F. Katz. 2008. *The Race between Education and Technology*. Cambridge, MA: Harvard University Press.

Gorodnichenko, Yuriy, and Gérard Roland. 2011. "Which Dimensions of Culture Matter for Long-Run Growth?" *American Economic Review* 101(3): 492-498.

Gorodnichenko, Yuriy, and Gérard Roland. 2016. "Culture, Institutions, and the Wealth of Nations." *Review of Economics and Statistics* forthcoming.

Greif, Avner. 1994. "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies." *Journal of Political Economy* 102(5): 912-950.

Greif, Avner. 2006. *Institutions and the Path to the Modern Economy*. Cambridge: Cambridge University Press.

Greif, Avner, and Guido Tabellini. 2015. "The Clan and the Corporation: Sustaining Cooperation in China and Europe." Stanford University Working Paper.

Greif, Avner, Murat Iyigun and Diego Sasson. 2012. "Social Institutions and Economic Growth: Why England and not China Became the First Modern Economy." Stanford University Working Paper.

Greif, Avner, and Murat Iyigun. 2013. "Social Organizations, Risk-Sharing Institutions and Industrialization." *American Economic Review* (P & P), 103:3, 534-38, May.

Greif, Avner, and Steven Tadelis. 2010. "A Theory of Moral Persistence: Crypto-Morality and Political Legitimacy." *Journal of Comparative Economics* 38: 229-244.

Grosfeld, Irena, Alexander Rodnyansky, and Ekaterina Zhuravskaya. 2013. "Persistent Anti-market Culture: A Legacy of the Pale of Settlement and of the Holocaust." *American Economic Journal: Economic Policy* 5(3): 189–226.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2006. "Does Culture Affect Economic Outcomes?" *Journal of Economic Perspectives* 20(2): 23-48.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2008. "Social Capital as Good Culture." *Journal of the European Economic Association* 6(2-3): 295-320.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales. 2016. "Long Term Persistence." *Journal of the European Economic Association* Forthcoming.

Hacker, Barton C. 1977. "The Weapons of the West: Military Technology and Modernization in 19th-Century China and Japan." *Technology and Culture* 18: 43-55.

Haidt, Jonathan. 2012. *The Righteous Mind: Why Good People Are Divided by Politics and Religion.* (New York, NY: Pantheon Books).

Hourani, Albert. 1991. *A History of the Arab Peoples.* Cambridge: Harvard University Press.

Howard, Douglas A. 1988. "Ottoman Historiography and the Literature of 'Decline' of the Sixteenth and Seventeenth Centuries." *Journal of Asian History* 22(1) 52-77.

Imber, Colin. 2016. "Koçi Beg/Gördidjeli Kodja Mustafa Beg." *Encyclopedia of Islam II* (Brill).

İnalcık, Halil. 1973. *The Ottoman Empire.* New York: Praeger.

Iyigun, Murat. 2015. *War, Peace and Prosperity in the Name of God.* Chicago: University of Chicago Press.

Iyigun, Murat, Naci Mocan and Ann Owen. 2001. "Ideology, Human Capital and Growth." Universtity of Colorado, Boulder, unpublished working paper.

Jha, Saumitra. 2013. "Trade, Institutions, and Ethnic Tolerance: Evidence from South Asia." *American Political Science Review* 107(4): 806–32.

Jost, J. John. 2006. "The End of the End of Ideology." *American Psychologist*, Vol. 61, No. 7, pp. 651–670; October.

Karaman, Kıvanç and Şevket Pamuk. 2010. "Ottoman State Finances in European Perspective, 1500–1914." *Journal of Economic History* 70(3): 593-629.

Karaman, Kıvanç and Şevket Pamuk. 2013. "Different Paths to the Modern State in Europe: The Interaction between Warfare, Economic Structure, and Political Regime." *American Political Science Review* 107(3): 603-26.

Koyama, Mark, Chiaki Moriguchi, and Tuan-Hwee Sng. 2016. "Geopolitics and Asia's Little Divergence: A Comparative Analysis of State Building in China and Japan after 1850." Working Paper.

Kuran, Timur. 2011. *The Long Divergence: How Islamic Law Held Back the Middle East.* Princeton: Princeton University Press.

Laber-Warren, Emily. 2012. "Unconscious Reactions Separate Liberals and Conservatives." *Scientifi American,* September 1.

Lewis, Bernard. 1973. *Islam in History.* New York: Library Press.

Lewis, Bernard. 2002. *What Went Wrong? The Clash between Islam and Modernity in the Middle East.* New York: HarperCollins.

Lott, John R. Jr. 1990. "An Explanation for Public Provision of Schooling: The Importance of Indoctrination." *Journal of Law & Economics* 33(1): 199-231.

Lowes, Sara, Nathan Nunn, James A. Robinson, and Jonathan Weigel. 2015. "The Evolution of Culture and Institutions: Evidence from the Kuba Kingdom." Working Paper.

Ma, Debin. 2004. "Why Japan, Not China, Was the First to Develop in East Asia: Lessons from Sericulture, 1850-1937." *Economic Development and Cultural Change* 52(2): 369-94.

Ma, Debin. 2005. "Between Cottage and Factory: The Evolution of Chinese and Japanese Silk-Reeling Industries in the Latter Half of the Nineteenth Century." *Journal of the Asia Pacific Economy* 10(2): 195-213.

Ma, Debin and Jared Rubin. 2016. "The Paradox of Power: Understanding Fiscal Capacity in Imperial China and Absolutist Regimes." Working Paper.

Mokyr, Joel. 1990. *The Lever of Riches.* Oxford: Oxford University Press.

Needham, Joseph. 1986. *Science and Civilization in China*, Vol. 5. Cambridge: Cambridge University Press.

North, Douglass. 1981. *Structure and Change in Economic History.* New York: Norton.

North, Douglass C. and Barry R. Weingast. 1989. "Constitutions and Commitment: The Evolution of Institutional Governing Public Choice in Seventeenth-Century England." *Journal of Economic History* 49(4): 803-32.

Nunn, Nathan. 2012. "Culture and the Historical Process." *Economic History of Developing Regions* 27(S1): 108-126.

Nunn, Nathan, and Leonard Wantchekon. 2011. "The Slave Trade and the Origins of Mistrust in Africa." *American Economic Review* 101(7): 3221-52.

Pamuk, Şevket. 2004a. "The Evolution of Financial Institutions in the Ottoman Empire, 1600-1914." *Financial History Review* 11(1): 7-32.

Putnam, Robert. 1993. *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton: Princeton University Press.

Rubin, Jared. 2011. "Institutions, the Rise of Commerce, and the Persistence of Laws: Interest Restrictions in Islam & Christianity." *Economic Journal* 121(557): 1310-39.

Rubin, Jared. 2017. *Rulers, Religion, and Riches: Why the West got rich and the Middle East did not.* Cambridge: Cambridge University Press.

Shaw, Stanford. 1976. *History of the Ottoman Empire and Modern Turkey.* Cambridge: Cambridge University Press.

Spolaore, Enrico and Romain Wacziarg. 2013. "How Deep are the Roots of Economic Development?" *Journal of Economic Literature* 51(2): 325–69.

Tabellini, Guido. 2008. "Presidential Address: Institutions and Culture." *Journal of the European Economic Association* 6(2/3): 255-294.

Tabellini, Guido. 2010. "Culture and Institutions: Economic Development in the Regions of Europe." *Journal of the European Economic Association* 8(4): 677-716.

Voigtländer, Nico, and Hans-Joachim Voth. 2012. "Persecution Perpetuated: The Medieval Origins of Anti-Semetic Violence in Nazi Germany." *Quarterly Journal of Economics* 127(3): 1339-92.

Wright, Mary C. *The Last Stand of Chinese Conservatism: The T'ung-Chih Restoration, 1862-1874.* New York: Atheneum.

Table 1: Numerical Simulations

Parameters	Case I	Case II	Case III	Case IV
α	.3	.3	.3	.3
β	.3	.3	.3	.3
θ	-6	-6	-6	-6
δ	.98	.98	.98	.98
τ	.10	.10	.10	.10
γ	1.2	1.2	1.2	1.2
λ	2	2	2	2
p	.50	.50	.60	.40
Pre-Shock Technology				
G	10	10	10	10
g	1	5	5	5
Pre-Shock Steady State				
$\overline{D}_0$	6.04	5.22	5.69	4.81
$\overline{I}_0$	6.88	5.68	6.16	5.30

Figure 1: Case I: $G = 10$, $g = 1$
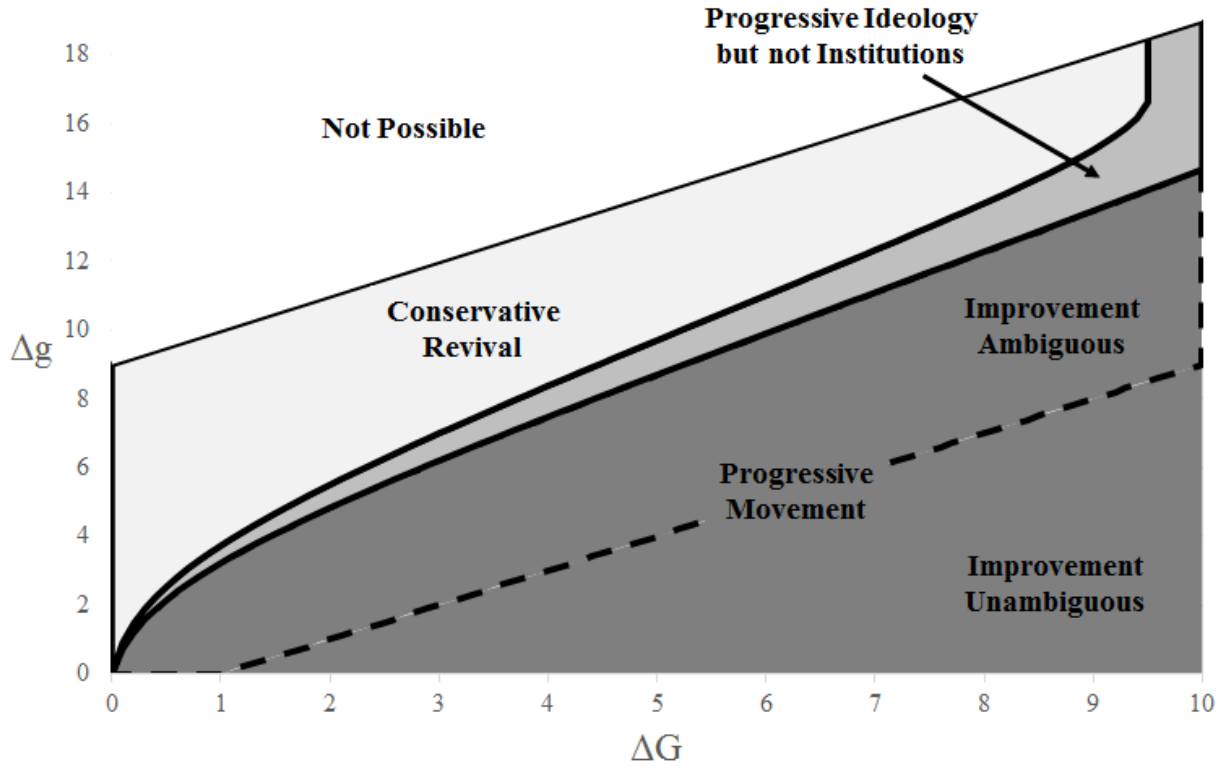
Figure 2: Case II: $G = 10$, $g = 5$
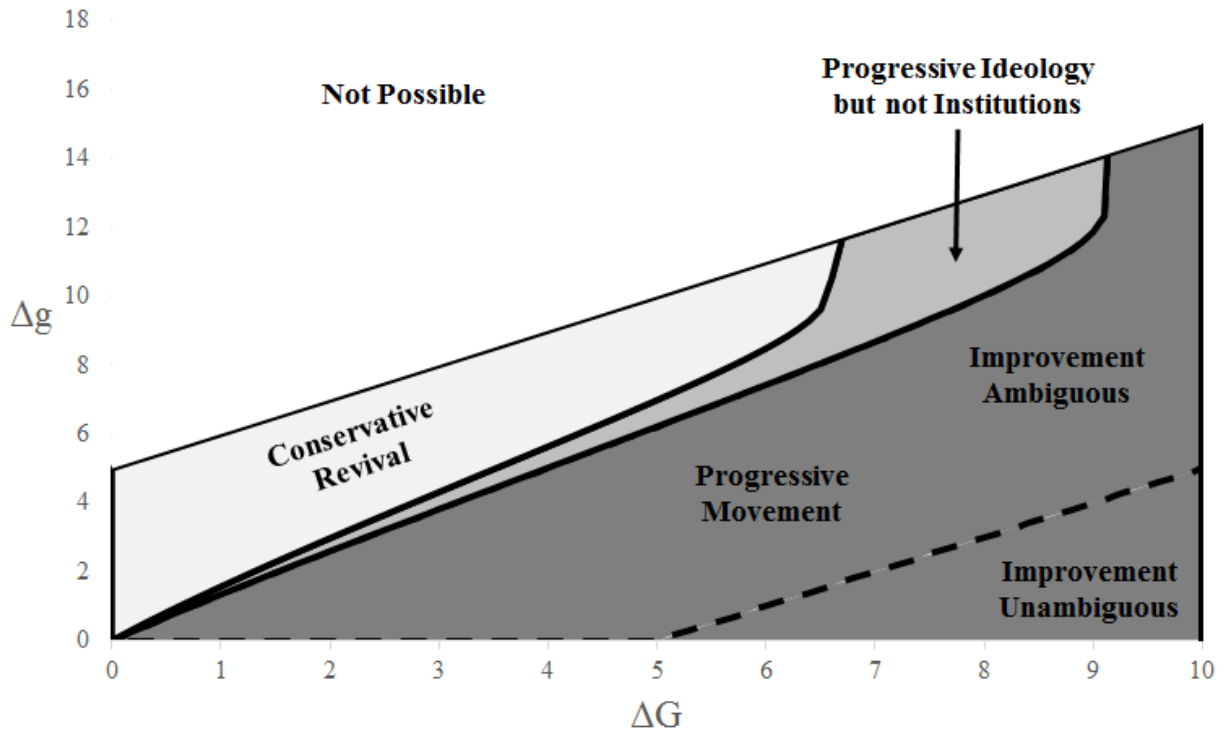
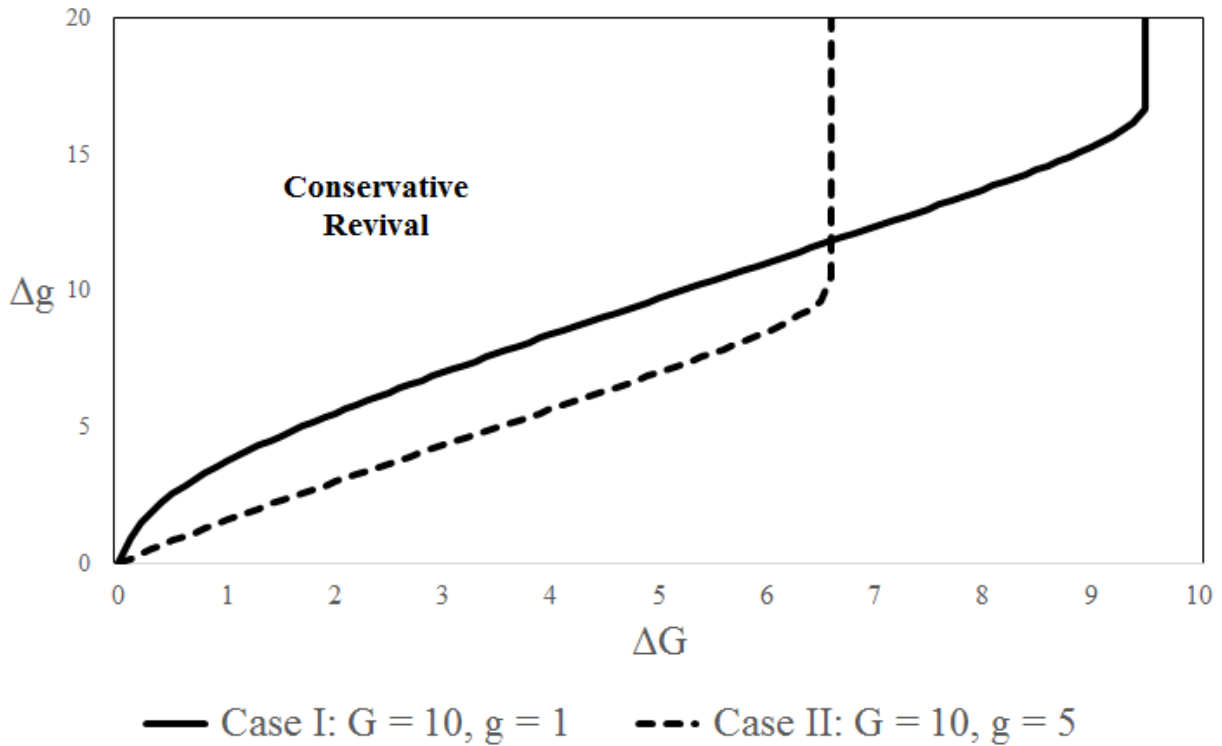Figure 3: The Ideological Transition Frontier, Case I vs. Case II

Case I: G = 10, g = 1 — — · Case II: G = 10, g = 5
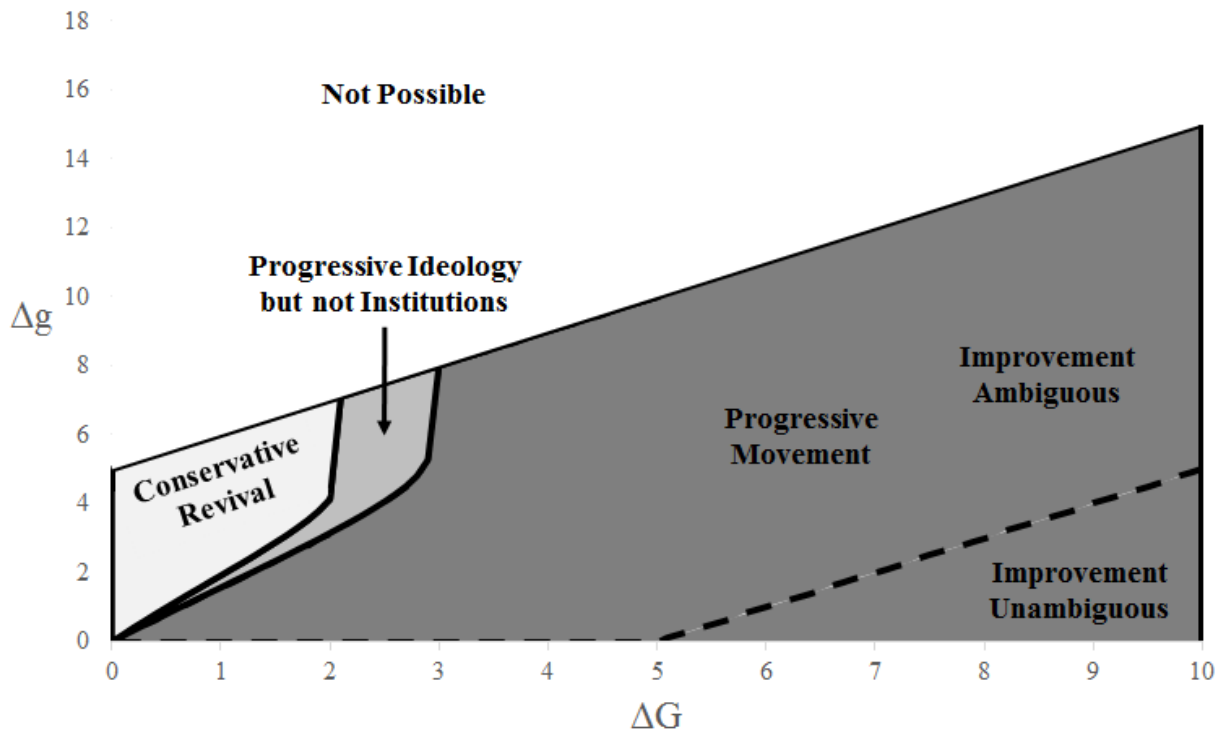
Figure 4: Case III: $G = 10$, $g = 5$, $p = 0.60$

Figure 5: Case IV: $G = 10$, $g = 5$, $p = 0.40$