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Ideology, Human Capital, and Growth: A Positive Theory of Religion and Scientific Knowledge

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Abstract

We develop an endogenous growth model in which technological progress raises the efficiency of time allocated to education and knowledge and ideology play complementary roles in determining individuals' efficiency units of labor input. A higher supply of aggregate units of efficiency labor generates incentives to invent new technologies because it raises the monopoly rents from the introduction of such technologies. We show that economies with initally more "fact-consistent" ideologies are likely to invest more in education and as a result experience faster technological progress and growth. Somewhat paradoxically, we also demonstrate that those economies that start out with relatively more fact-consistent ideologies are the ones likely to experience a weakening support for their ideologies. Support for flexible ideologies that evolve over time remains high even in the long run. When there exists a

\There are no truths, only interpretations."

1. Introduction

w_t

$$w_t \quad ® \left(\frac{M_t}{L_t}\right)^{®}$$

3.2. Individuals

p tgjd. Tth s, g

h_i

Remark 1: (i) h_{t+1} ; higher I_h^k; implies that the mapping I^k : is more \e±cient" at that level of h_{t+1} and that the ideological inference, $\tilde{A}_{t+1}^k$ is more accurate: (ii) Higher human capital elasticity of ideological inference, $I_h^k\, h/I^k$; implies that ideology k is more \°exible."

t I_{t+1} h_{t+1}

I_{t+1}

$$I_{t+1} \begin{cases} I\, h_{t+1};\ \tilde{A}_{t+1}^k & k; \\ h_{t+1}^0 \quad \tilde{A}\ e\ \acute{A}_t; \end{cases}$$

I : I ; $\tilde{A}_{t+1}^k$

I h_{t+1}; ; I ; $\tilde{A}_{t+1}^k$ I h_{t+1}; I_h; $I_{\tilde{A}}$ > ; I_{hh}; $I_{\tilde{A}\tilde{A}}$ $I_{h\tilde{A}}$ $I_{\tilde{A}h}$:

Remark 2: (i) When $\tilde{A}_{t+1}^k > h_{t+1}$ I h_{t+1}; $\tilde{A}_{t+1}^k$ h_{t+1}I ; a > h_{t+1}^0 where a $\tilde{A}_{t+1}^k/h_{t+1}$ > (ii) When $\tilde{A}_{t+1}^k$ h_{t+1} I h_{t+1}; $\tilde{A}_{t+1}^k$ h_{t+1}I ; a $\gtreqless$ h_{t+1}^0; where a $\tilde{A}_{t+1}^k/h_{t+1}$:

Proof: I :

$e_{\tilde{A}}$; I_h; $I_{\tilde{A}}$ > ; I_{hh}; $I_{\tilde{A}\tilde{A}}$ $I_{h\tilde{A}}$ $I_{\tilde{A}h}$: □

k

h_{t+1} a

Proposition 1: If ideologies are in°exible so that their human capital elasticity of ideological inference, $I_h^k h=I^k$, is less than unity, then Á Á ; such that, $Á_t$ Á individuals subscribe to ideology k; and $Á_t > Á$; individuals subscribe to no ideology k; k ; ·

Proof: $Á_t$; e ;$\tilde{A}^k_{\max}$ h_{t+1} Ã

Á

$\tilde{A}^k_{t+1}$

[22]

t q_t

t t

$M_t;$

$$M_t \quad \frac{Á_t\ q_t}{®\bar{®}}:$$

$Á_t$

$Á_t \quad gÁ_{t\,¡\,1} \quad g >$ [23]

3.4. The Adoption of New Technologies

j; j ; ;

$$¼^j_t \ _{Á^j_t;\, q^j_t;\, L^j_t} \quad M^j_t{}^{®}\ L^j_t{}^{1\,¡\,®} \quad p_t q^j_t \quad w_t L^j_t;$$

p_t ;

j ; ;

$$q^j_t \quad \left[\frac{Á^j_t{}^{®}\ L^j_t{}^{1\,¡\,®}}{p_t} \right]^{\frac{}{¡\,®}}:$$

[22] Clearly, all of the results developed so far would go through if we assumed that technological progress were exogenous. By endogenizing technological cy.375 i Tc (a) Tj 5.25 0 TD 0.2895 Tc (l) Tj 6.75 0 TD -0.171 Tc (.375 Tc (

χ_t: t

c:[24]

c/α;

p_t/c $/\alpha$

Lemma 1:

$$\frac{p_t}{c} \quad \left(\frac{}{\alpha};\ gc \quad > \quad \right):$$

Proof:

χ_{t-1} c:

χ_t p_t: p_t/χ_t c/χ_{t-1}

p_t gc:

p_t/c $/\alpha$ $gc >$ $/\alpha$; p_t/c g gc $/\alpha$:

□

[24] We have chosen to maintain a constant marginal cost for machine production to keep the analysis focused on the relevant dynamics. If the cost of machine production was allowed to vary over time, increased sophistication of the technology would argue for an increasing cost but higher production efficiency could have a potentially offsetting effect.

! $_t^n$= ! $_t$;   n   ; ; ; :::; N

t

n

! $_t^n$= ! $_t$

c

Proof:

□

$\omega_t; \omega_t$

$N\omega_t^n$ [27]

Proposition 3: $n \quad ; \; ; \; ; \ldots ; N;$

$$\frac{\partial \omega_t^n}{\partial \pi_t}\bigg| \quad \omega_t^n \quad \omega_t^n > \; :$$

Proof:

4. The Dynamics

ϕ_t

$$\phi_t \quad \begin{cases} g\phi_{t-1} & \lambda_t \\ \phi_{t-1} & \lambda_t; \end{cases}$$

[27] By assumption, there is free-entry into research and development by relatively small firms. Those firms ignore their impact on both the economy-wide probability of success in generating new inventions and the total number of R&D firms (which in turn affect the conditional odds of landing monopoly rights). If there had been one large firm engaged in R&D, it would have taken into account the effect of changes in its R&D resources, ω_t, on the probability of invention, λ_t, but the qualitative nature of the results would have been unaffected. Similarly if there had been barriers to entry into the R&D sector which would have restricted the number of firms engaged in research and development, we would have had to consider a game-theoretic solution but again the qualitative nature of the main results would have remained intact.

Proposition 4: t 0 the set of available ideologies, ; · a®ects the evolution of the state variable Á$_t$; which in turn determines the stochastic dynamic evolution of the economy.

Proof: I¸ >

I^k : L$_t$

@¼$_t$=@L$_t$ > @ !$_t^n$=@¼$_t$!$_t^n$!$_t^n$ > : h$_t$

I^k :

¸$_t$ ¸ N !$_t^n$: □

5. Implications and Further Discussion

I) Technological advances will lead to lower (higher) support for ideologies that impede (enable) their followers from adjusting their ideological inferences accordingly.

II) Inflexibilities in ideological interpretations will lead to depressed worker productivity, slower economic growth and development.

V) Widespread adoption of new ideologies is more f [illegible]

7. Appendix

7.1. Proof of Proposition 2:

n n ; ; ;:::N;

! t

8
<
! t ; ¸ t¼t B ! t ;
:

¸ t¼t < B ! t

¸ t¼t > B ! t

! t ! t

! t ; ! t N ! n t ; ! t ;

□

7.2. Proof of Proposition 3:

@ ! n t / @¼t ! n t ! n t N B ¸ t / ¸ 0¼t ;

¸ t¼t B ! t :

¸ 0 > ; ¸ 00 B ¸ 0¼t

□

8. References

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Bec8e- iCc8 e- c 9 2 3 4 T 3 0 . 3 0 6 T c (r) T j 5 . 2 5 0

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Figure 1.a

ψ^k_{t+1}

$\psi^k_{t+1} = h_{t+1}$

ψ

$\psi^k(h_{t+1})$

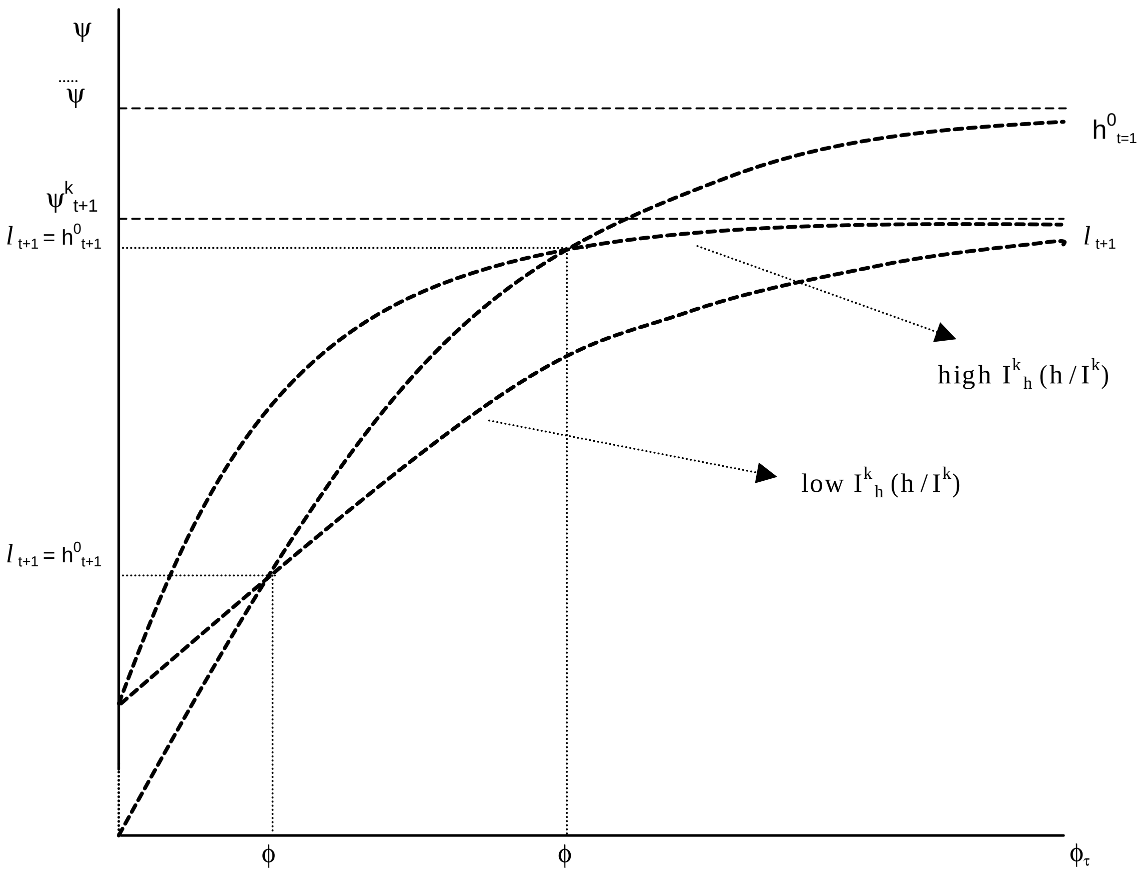
ψ^k_{max}

$h_{t+1}(\psi^k_{t+1})$

$I^k(0)$

$\psi e(\phi, 0)$ $\psi e(\phi,\psi$

Figure 2:


ψ
ψ̈
ψ^k t+1
l t+1 = h^0 t+1
h^0 t=1
l t+1
high I^k h (h / I^k)
low I^k h (h / I^k)
l t+1 = h^0 t+1
φ
φ
φτ