The Empirical Importance of Private Ownership for Economic Growth

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Another century of widening participation in the global marketplace and rising international flows of goods and capital is winding up. Yet there are still apparently durable differences in national productivity even among the most advanced national economies. Many economies remain backward and few of them have begun the process of catching up.

The explanation that some countries are undersupplied with capital and technology is no longer tenable. Capital is quite mobile across borders – witness the near equality of long-term national real interest rates; besides, in countries' rapid investment stage, national investors seem to be driven to step up their own saving. Technology is similarly available at a normal price. Some argue that deficiencies in skill stand in the way of equal productivity. But most training is offered by employers and, in advanced economies at any rate, they seem to finance such human capital about as easily as they fund tangible investments. The trainability of the labor force is conditioned by their education, of course, and it takes time to increase education. But in the long run the market mechanism can be expected to equalize the private rate of return to schooling, except where the state has driven it below market-sustainable levels. So little education is not the root of low productivity either.

The answer to the puzzle of permanent productivity differences among nations, such as those left after "conditional convergence," must lie in their differing political economy. Within the neoclassical tradition of economics, starting with the work of Douglass North (1981), the emphasis is on underlying social

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conditions that weaken the incentives of enterprises and persons to invest. "Poorly enforced property rights due to, for instance, lax crime enforcement, weak court system, excessive regulations and poor patent protection," as Jakob Svensson (1994) sums up, "create a wedge between the marginal product of capital and the rate of return that can be privately appropriated by investors." In a related model by Aaron Tornell and Andres Veslasco (1992), political polarization makes investors fear expropriation by a hostile faction. In either case the results are a decline of investment and growth in the market sector in favor of the underground sector and capital flight.

Fear of expropriation is not the only antagonist to growth in the neoclassical perspective. Social conditions may lower expected returns also by threatening capital's *social* product, as when a plant is sacked by rioters or hit in an air raid. High tax rates are also burdensome for output per head, even for output per worker. And, as noted, illiteracy and innumeracy act as a drag on a country's ability to exploit advances in technology.

In the expropriation theory, and in the neoclassical perspective more generally, the cause of low productivity is exogenous to the *economic* system. And any profit-maximizing system will suffice for its purpose. The theory still functions when adapted to a system of *state* enterprises and persons operating in markets. Profit maximizing state enterprises, those playing the Lange-Lerner market-socialism game or those pursuing their own interests, will shy from investing where there are risks that a new government will lower the price, tax the proceeds, cut tariff protection, etc. State enterprises also have to worry about crime and labor-union obstruction.

More broadly, the neoclassical theory sees *no* consequences for productivity growth whatsoever in whether the market sector is mainly private or mainly state-owned. If markets are perfectly informed and form rational expectations regarding sociopolitical risks, and as a result the resource allocation is Pareto efficient, it does not matter for economic growth whether it is state enterprises or private ones that have to enter debt or equity markets for financing.

This paper starts from the contrary supposition that economic institutions make a difference and deficiencies in nations' economic system typically account for a substantial part of their

economic underperformance – the standard view in Schumpeter's generation and one being reestablished by modern theorists such as Mancur Olson and Oliver Williamson. In this perspective, there is some presumption that extensive private ownership and control of production tends to improve or impair, as the case may be, the performance of a country's market sector. The question is: Which is it?

In the aftergloom following the interwar years it was widely believed that private enterprise was economically disadvantageous, owing to its vulnerability to unemployment and underinvestment. As the conservatives Milton Friedman and Henry Wallich saw it, that "cost" was worth paying to preserve personal and political freedom. Welfare state visionaries thought the cost could be cut by public expenditures (largely on the output of the private sector) to reduce unemployment and high budget surpluses to boost national saving.

Proponents of capitalism also did some serious theorizing on its advantages, however, such as von Mises (1949). Now, set off by the turn away from socialism in eastern Europe, there is a new round of thinking on the economic gains from private ownership and control of enterprises.

With this paper we set out to weigh the evidence. Our findings are highly tentative, since a great many other factors must be allowed into the statistical analysis to have confidence that any estimated influence of private ownership is not spurious, a result of omitted variables. That said, we must also say that, so far, the key statistical results are proving surprisingly robust to the introduction of additional factors.

Our provisional finding is that, in general, an increase in the share of output put under private ownership and control, other things equal, serves to raise the rate of growth of national productivity. Moreover, in our estimates, the size of this effect is impressive. If that is correct, a great many underdeveloped countries can open a door to much higher productivity by turning over to private enterprises much of the commercial activity that so far remains in the state sector. Even among the advanced economies, substantial privatization can make a significant difference for wages and output per worker.

I. The Neoclassical Growth Equation

In the neoclassical set-up, a nation's gross domestic product, to be denoted Z below, is some constant-returns-to-scale function, F, of its capital, K, the labor input, L, augmented by the effective technology, and natural resources, R, similarly augmented. The concession to realism here is that although the world technology, Λ, is posited to be available freely to entrepreneurs and their engineers, there being no imperfectly informed agents in the neoclassical setup, only a part of it is usable as a result of limitations in the literacy and numeracy of the country's workers. ("What use is modern technology," *The Economist* asks, "if a poor country's workers cannot read the instructions on a bag of fertilizer?") The usable technology in the ith country, A_i, increases with the average schooling of its labor force, ε_i, at a diminishing rate given by η (<1). Then the country's output per worker, z_i, is

$$(1) \quad z_i = \varepsilon_i^{\eta} \Lambda \, F(k_i, 1, R_i/L_i), \quad z \equiv Z/L, \quad k \equiv K/(\varepsilon^{\eta} \Lambda L),$$

where the elasticities of F(.) are positive, less than one and add up to one. The change in output per unit time is then

$$(2) \quad dz_i/dt = [\eta (d\varepsilon_i/dt)/\varepsilon_i + (d\Lambda/dt)/\Lambda - \gamma (dL_i/dL_i)/L_i]z_i + \varepsilon_i^{\eta} \Lambda \, F_k (k_i, 1, R_i/L_i) \, dki/dt,$$

where $\gamma(k, R/L)$ denotes the elasticity of output with respect to natural resources and $F_k (\, . \,)$ gives the marginal productivity of capital gross of depreciation. Obviously, even if the motion of ε is treated as exogenous, completing the system requires the dynamics of k_i.

In the Solow-Swan model, the motion of k is derived by equating domestic investment to national saving and regarding the latter as a policy variable or quasi-constant as a ratio to national income. But this describes a *closed* economy, at any rate one closed to the world capital market. The great majority of the countries in our data set were fairly open over our sample span, 1960-1985; to our knowledge, large discrepancies in interest rates were few. Furthermore, interest rates were not moving with independent trends, as they would if there were disparate trends in government interference with capital flows. If so, we will do better with an open-economy approach.

If capital moved instantaneously from country to country to

eliminate incipient discrepancies between the domestic rate of return and the world interest rate, we would have

$$(3)\quad F_k\,(\,k_i,\,1,\,R_i/L_i\,) = r^* + \delta,$$

where r^* is the short-term world real rate and δ, the depreciation rate, is a constant. In this case,

$$(4)\quad dk_i/dt = (k_i F_{kk}/F_k)^{-1}[(k_i F_{kR/L}/F_k)(dL_i/dt_i)/L_i + (\overrightarrow{dr^*/dt})/(r^*+\delta)]k_i.$$

In this variant of the model, dk_i/dt does not possess the convergence property that $\partial(dk_i/dt)/\partial k_i < 0$. The capital stock is not homing in on some natural path from which it is initially away, since it is already on that path. Hence the growth rate equation, which is easily derivable from (2) and (4), does *not* make the growth rate depend on the initial value of k_i – and hence on initial z_i. The current output growth rate depends positively on the rate of growth of ε_i and of Λ and negatively on the growth rate of L_i – and on nothing more, absent the political factors acknowledged in the introduction. The present variant of the model says simply that the *level* of productivity depends on the level of education and the level of natural resources, given the world interest rate and the world technology in existence. (See (1) and (3).)

An alternate version of the open-economy neoclassical model has adjustment costs implying a capital-stock adjustment equation

$$(4')\quad dk_i/dt = I\,(\,F_k\,(\,k_i,\,1,\,R_i/L_i\,) - r^* - \delta\,) - (\delta+\eta(d\varepsilon_i/dt)/\varepsilon_i+(d\Lambda/dt)/\Lambda+(dL_i/dL_i)/L_i)k_i,$$

where I (.) denotes gross investment demand per unit of effectively augmented workers, $I/\varepsilon^{\eta}\Lambda L$, and has the usual properties, I (0) = 0, I'(.) > 0. This adjustment equation makes dk_i/dt decreasing in k_i, at least locally. To be precise we consider at each t the value of $k_i(t)$ such that in (4') $dk_i(t)/dt = 0$. Around that sequence of values, to be denoted $k_i^*(t)$, the effect at each t of a small increase of $k_i(t)$ is

$$(5')\quad \partial(dk_i/dt)/\partial k_i = I'(.)F_{kk}(.\,) - (\delta + \eta(d\varepsilon_i/dt)/\varepsilon_i + (d\Lambda/dt)/\Lambda + (dL_i/dL_i)/L_i)) < 0.$$

To characterize the behavior of the growth rate of output it is helpful to approximate $dk_i(t)/dt$ around $k_i(t) = k_i^*(t)$ with

(6') $dk_i(t)/dt = \partial(dk_i/dt)/\partial k_i|_{k=k^*} (k_i(t) - k_i^*(t))$

Then (6'), (5'), (2) and the further approximation

(7') $z_i(t) - z_i^*(t) = (k_i(t) - k_i^*(t))\varepsilon_i^{\eta}\Lambda F_k (k_i^*, 1, R_i/L_i)$

from (1) give the approximate productivity-growth equation

(8') $dz_i/dt = [\eta(d\varepsilon_i/dt)/\varepsilon_i + (d\Lambda/dt)/\Lambda - \gamma(dL_i/dL_i)/L_i]z_i$
$+[I'(.)F_{kk}(.) - (\delta+\eta(d\varepsilon_i/dt)/\varepsilon_i+(d\Lambda/dt)/\Lambda+(dL_i/dL_i)/L_i))]$
$\times (z_i(t) - z_i^*(t))$,

or, rearranging terms to obtain the growth *rate* of productivity,

(8'bis) $(dz_i/dt)/z_i = \eta(d\varepsilon_i/dt)/\varepsilon_i + (d\Lambda/dt)/\Lambda - \gamma(dL_i/dL_i)/L_i$
$+ [I'(.)F_{kk}(.) - (\delta+\eta(d\varepsilon_i/dt)/\varepsilon_i+(d\Lambda/dt)/\Lambda+(dL_i/dL_i)/L_i))]$
$\times (1 - (z_i^*(t)/z_i(t)))$.

A term involving the ratio $z_i^*(t)/z_i(t)$ appears on the righthand side. Note that $z_i^*(t) = \varepsilon_i^{\eta}\Lambda F(k_i^*(t), 1, R_i/L_i(t))$ and $k_i^*(t)$ is given by (4') with the righthand side set equal to zero; so $k_i^*(t)$ is a function of r^*, δ, R_i/L_i and the growth rates of ε_i^{η}, Λ and L_i. Hence $z_i^*(t)$ is proportional to $\varepsilon_i^{\eta}\Lambda$, with the factor of proportionality a function of r^* etc. Hence output per worker figures in the righthand side of (8'bis) through the ratio $\varepsilon_i^{\eta}\Lambda/z_i(t)$. (The weight of this ratio in the equation is greater (in absolute value) the lower is r^*, δ and the growth rate of $\varepsilon_i^{\eta}\Lambda L_i$, since $k_i^*(t)$ is then greater and the subtractor in the square-bracket expression is also larger.) Thus a country's output per worker *approaches* a path indexed by the domestic education level, which may itself be exogenously changing through time.

In this alternate model, then, an explanatory variable in the growth rate equation is the *level* of domestic output per worker as a *ratio* to (a function of) the domestic education level augmented by the world technology – a ratio to which the growth rate is inversely related. (The growth rate of the labor force is also an expanatory variable, besides its role in modifying the role of the

output variable.) Hence, output per worker in any two countries having the same structural equations and displaying equal growth rates of labor supply and schooling (say, zero rates) will be growing in logarithmic parallel – showing the same sequence of growth rates of output per worker.– if the initially higher education level of the one was counterbalanced by a sufficiently higher initial level of output and capital per worker in such a way that the marginal product of capital was equal.

In view of these results, it makes sense from the neoclassical viewpoint to regress the growth rate of output per worker in a cross-section of countries on $\varepsilon_i{}^{\eta}\Lambda/z_i(t)$. In this spirit, using the data from the set of countries we will be using to test our private ownership hypotheses in the next section, we have estimated the regression equation:

$$(9') \quad GR6085 = 0.0046 - \underset{(t = 3.22)}{0.00843}GDP60$$

$$+ \underset{(2.86)}{0.0286}PRIM60 + \underset{(1.94)}{0.0492}SEC60,$$

where GR6085 is the annualized growth rate of output per head between 1960 and 1985, expressed in decimal form; GDP60 is gross domestic product per head in 1960; PRIM60 is the enrollment ratio of primary-school-age persons in 1960 and SEC60 is the corresponding ratio for secondary-school-age person. The output data come from the Summers-Heston Penn world tables and the education variables are from the Barro-Lee data set.

It is encouraging that our 43 country sample appears to generate estimates that resemble, at least qualitatively, the estimates by Robert Barro and Xavier Sala-i-Martin (1995). Increased education is effective in raising growth. And what they have dubbed "conditional convergence" is implied, since the growth rate of output per head is lower the smaller is its initial level and the level that it approaches is conditional on its education attainments.

II. Modern Growth Equations

Our proposition is that the real income per worker produced in a country depends not only on the world technology and the stock of schooling of its population. It also depends very much on the extent

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~~to~~ the economy's openness to entrepreneurship and thus innovation. There can be entrepreneurial state enterprises, of course – and there have been. But a line of economists, starting with Schumpeter and vonMises (if not Marx) to, say, Frydman and Shleifer in our day, have seen reasons to believe that state enterprises will not match the innovation in private enterprises. (For surveys see Phelps (1992, 1993).)

- The private enterprise under capitalism is actuated by a vision of one or more of its owners about what product or process will be profitable – or cease to be profitable – and such visions are private, intuitive, hard to articulate and to defend; but no public justification is required. The enterprise owned by the democratic state is blocked from many actions it judges would be profitable by the need to go through bureaucratic procedures or otherwise seek public approval.
- State-owned enterprises tend to slip into the service of interest groups rather than serve the economy's productivity, while, ideally, the private enterprise has only to attend to its bottom line.
- Private investors have a long time horizon, as they can reap expected future benefits in the present by selling off shares in their project to one or more knowledgeable buyers from the next generation, while the politician dependent on electoral support cannot bank persuading a majority of voters to reward for theoretical "jam tomorrow."
- Managers at private enterprises are farther from the seat of state power than state enterprises typically are. And their applications for state aid or exemption from laws are seen as self-serving, while the claims of state enterprises may be seen as expressing a public interest. , So they find lobbying relatively unproductive – and investing and innovating comparatively productive.

For these reasons and others, it would be difficult to offer to state-enterprise managers a "carrot" of financial incentives to innovate as powerful as those presented to private enterprises. And the "stick" of insolvency, takeover or a stoppage of financing faced by a private enterprise – under conditions such as reasonably free entry and effective corporate control by private owners, at any rate – is a better spur to innovation than the threats the state can mount against its managers. Furthermore, even where a substantial private sector exists alongside a larger public sector, the lure of contracts with monopoly enterprises in the state sector or with the central

government overseeing that sector generates an orientation toward rent-seeking in the private sector rather than toward innovation.

The foregoing implies that enterprises do not have available to them a *known* "world technology" – not one known by them. To innovate enterprises must explore some of the bits of technology or other knowledge that they are capable of locating in order to make a guess about whether some product or process that would be new to them would offer sufficient prospects of profit to be worth undertaking. While the investing enterprise of the neoclassical theory *knows* the possible technology and draws upon that part of it that can be economically utilized by workers in view of their educational limitations, the entrepreneur of the modern model is not so up to date but constantly improving his knowledge. Thus the innovators operating in a country are engaged in a process of bringing the technology level realized in the economy's products and processes closer to what is possible – while technological advances are pulling in the opposite direction to leave actual practice farther behind.(What is said here about scientific and engineering knowledge applies also to knowledge of legal systems, foreign cultures and much else.)

According to the hypothesis of this paper, the pace of improvement of the actual, or realized, technology level, will be faster the greater the share, π, of production under the ownership and control of private entrepreneurs, since they are the most effective innovators. Further, for a given innovative effort, the pace of improvement in the technology in use will depend on the current room for improvement, hence the size of the gap between actual and possible. Hence, denoting the *actual* technology in the ith country by A_i, and the *possible* technology by Λ, we write

$$(10) \quad dA_i(t)/dt = \phi(\pi)\,[A_i(t) - \Lambda(t)],\ \phi'(\pi) > 0,\ \phi(0) \geq 0.$$

Equation (10) is implicitly behind a similar looking equation in the Nelson-Phelps paper (1966). Their equation expressed the distinct hypothesis that, *given* private ownership of production, the ability of the entrepreneurs to innovate depended on their education. {What use is the world's viniculture technology if vintners do not have at least a master's degree from the University of California at Davis in order to understand product specifications and published analyzes of techniques?) We turn later to the

education of entrepreneurs.

REGRESSION TESTS

Testing the private ownership hypothesis requires assembling data on the extent of private ownership in a set of countries of sufficient size. Branko Milanović (1989, p. 15)) estimates for each of some 40 countries the percentage of national output produced by "state-owned enterprises" engaged in "commercial activities," hence state production net of "government services proper." We have adopted the *negative* of this percentage as the variable, labeled PRIVATE1, capturing the scope of private enterprise and control in our regressions. (It is bounded by - 100 and 0 and its mean is - 11.7 in the sample.)

Table 1 records the regression results of principal interest. The first one (column (1)) is the simple regression of GR6085, a decimal with mean value of 0.022 per annum, against PRIVATE1. According to the coefficient estimate (0.00067), a swing of the explanatory variable from -100 to 0 in a country would improve its annual growth rate by 0.067, a tripling for a country whose growth rate was average in the sample. Although the t-ratio (2.37) is merely respectable, this estimate will be seen to be surprisingly robust to the subsequent inclusion of the variables added below.

The second regression (column (2)) accompanies the private ownership variable with the education variables used in the neoclassical regression. Now the t-ratio of PRIVATE1 is considerably stronger. The t-ratio of PRIM60 is also much stronger, while that of SEC60 is weaker than before – and far weaker than that of PRIVATE1. The coefficient of PRIVATE1 has slipped only slightly.

The next regression addresses the question of whether the private ownership variable is proxying for something other than private ownership per se. It might be thought that its significance in the regression depends on the inclusion in the country set of some countries that are socialist and therefore pursue several policies, not just a policy of extensive state enterprise, that trade off growth for other goals. (In fact our data set excludes countries that Milanović regarded as "socialist" in the '70s and early '80s, such as China and the Soviet Union.) To this end, we add SOC, a dummy variable for social economic systems, and MIXED, a dummy variable for so-called mixed economies, both variables from the Barro-Lee data set

and due to Gastil. Of these, SOC is close to being significant. Our PRIVATE1 remains significant, though at a lower level, and the coefficient falls by a quarter.

The fourth regression, which is similarly motivated, controls for government consumption (in OECD terminology). Since growth might suffer from military engagements or threats thereof, and since education has already been allowed for, we used the share in the gross domestic product of government purchases excluding military and education expenditures, HSGVXDXE. It did not prove significant.

The fifth and last regresion to be reported here proposes that, as suggested by the Nelson-Phelps hypothesis, the effectiveness of entrepreneurial effort is potentiated by entrepreneurs' higher education, which may very well induce increased effort as well. This suggests that, besides the PRIVATE1 variable, there should be a variable capturing the interaction between the importance of private entrepreneus and their higher education. We use SEC60 to proxy for the extent of higher education in the population. The product of SEC60 and PRIVATE1 is the interaction variable, labeled INTER1 in column (5). Unfortunately, the interaction term is not statistically significant. Some measure of higher education other than the breadth of secondary education might fare better, but we have not succeeded with the measure at hand.

We have obtained some other results that raise a question. We have found that, to paint with a broad brush, the sociopolitical variables, such as the index of political coups and the Gini coefficient, to name just two, do not contribute much once our private ownership and education variables are in place. It would be tempting to capitalize on these results by announcing the surprisingly strong finding that the choice of economic system and the provision of education transcend in importance the sociopolitical climate in which the economic system functions. But although the political variables do seem to recede in importance once the economic variables are brought in, the regressions giving these results all contain one of the more odd variables in the Barro-Lee data set, namely the average annual rate of improvement of the terms of trade, a variable that turns out to be strongly significant. Unfortunately we do not understand at this point why this variable has a *negative* effect on the growth rate, and a fairly powerful one

at that. Pending a resolution of this question we prefer not to report our preliminary findings on the sociopolitical variables.

III. Concluding Remarks

The findings here are of significance on two levels. If our findings are correct, all countries but the most dedicated adherents of capitalism have it within their power to step up markedly the pace of productivity growth in the their economies by relinquishing to private interests the ownership and control of commercial enterprises still remaining in the hands of the state. For continental western Europe, now stagnating under the weight of welfarist conceptions, and those parts of the third world that put their faith in state-led growth, this presents an extraordinary opportunity to boost productivity and wages.

Although this practical side is justifiably the one that is bound to be of widest interest, the findings here are also important for the theoretical perspective we take on the economic growth of nations. The neoclassical approach finds itself locked into the premises that markets are perfect and expectations are rational. In such a view there is not much in the way of an apparent role for the visions of private entrepreneurs. The recent commentary on two Wisconsin entrepreneurs, Lynde and Harry Bradley, that "it took courage and confidence for them to risk resources in a new venture, based only on their judgment of what was and their vision of what could be," is utterly foreign to the neoclassical approach. We suggest, however, that our understanding of the true roots of economic growth will not get very far without grasping the role of an economic philosophy, still prevalent among some nations, that is willing to entrust the ownership and management of resources to private interests.

But are our findings correct? We have to worry that private enterprise is no better than state ownership where the sociopolitical environment is not propitious – where there is great sociopolitical conflict, for example. Perhaps, in such an environment, private enterprises, though still superior to the state in picking investments, would invest far less in toto than state enterprises would. We need to test for such possible interactions before we can feel highly confident in the thrust of these, our first results.

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Table 1 - Five Modern Cross-section Growth Rate Regressions

Expl.var.	(1)	(2)	(3)	(4)	(5)
Constant	0.0294 (6.83)	0.0114 (1.92)	0.0120 (1.97)	0.011 (1.72)	0.0097 (1.39)
PRIVAT	0.00067 (2.37)	0.00063 (2.66)	0.00046 (1.70)	0.00048 (1.69)	0.00051 (1.55)
GDP60		-0.0077 (-3.17)	-0.0084 (-3.19)	-0.0084 (-3.14)	-0.0081 (-3.16)
PRIM60		0.031 (3.35)	0.030 (3.10)	0.031 (3.02)	0.033 (3.31)
SEC60		0.037 (1.54)	0.042 (1.70)	0.042 (1.66)	0.044 (1.59)
SOC			-0.013 (-1.36)	-0.013 (-1.26)	
MIXED			0.00014 (0.025)	0.00019 (0.034)	
HSGVX				-0.0000 (-0.32)	
INTER1					0.00065 (0.51)
no. obs.	43	43	43	43	43
adj R^2	0.099	0.404	0.411	0.396	0.392