GROWTH ISSUES IN DEVELOPING COUNTRIES: AN OVERVIEW

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ABSTRACT

This brief overview highlights some of the most relevant aspects addressed in the differemt papers, concerning a wide range of countries in the world, in this especial issue devoted to economic growth.

All papers have a common core: how economic policy affects growth, especially emphasizing the determinants of productivity growth and the relation between international trade and growth.

SÍNTESIS

En esta edición especial dedicada al crecimiento económico, esta breve reseña destaca algunos de los aspectos más relevantes abordados en los trabajos, relativos a un gran número de países en el mundo.

Todos los documentos tienen un núcleo común: Cómo la política económica afecta el crecimiento, subrayando, por modo especial, los determinantes del crecimiento de la productividad y la relación entre el comercio internacional y el crecimiento.

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The last five years have undergone a revival in growth theory which has spurred considerable theoretical and empirical work in a field that had remained dormant for more than a decade. This revival was triggered by the need to come up with answers to the question of whether a growth policy could be theoretically formulated and hence whether growth performance could be improved. Does trade affect growth? Should countries pursue export promotion policies? Why do some countries exhibit high growths rates for a long period of time while others display backwards technologies? Which is the role of technological progress, and how is it brought about? Are political institutions of any consequence for growth performance?

Even though many of the questions raised above are related to economic policy, the neoclassical view initially developed by Ramsey (1928) and further refined in the fifties and sixties, mainly by Solow (1956), Cass (1965), Koopmans (1965) and Uzawa (1965), was unable to provide satisfactory answers. In these models, there was no role for economic policy to affect growth. Owing to assumptions made on technology, any short run effect on growth would vanish in the long run as the economy reached a new steady state. Consider the equation for the dynamics of the capital/labor ratio stock in the Solow model:

$$\dot{k} = sf(k) - nk ;$$

where s is the saving rate, n is the population growth rate y f(k) is output per worker.

Constant Returns to Scale (CRS) are assumed so that $f'(k) < 0$. The steady state is reached at the point in which $\dot{k} = 0$, or when the per worker capital stock equals its steady state value $k^* = sf(k^*)/n$. An increase in the savings rate, for example, would increase the steady state level of income, inducing growth

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only along the transition path. This lack of persistent growth did not discourage many practitioners of economic policy since, as far as they were concerned, these transitional dymanics were important in themselves. At the empirical level though the fact that the Solow model generated a steady state with no growth was disturbing because two of the 'Kaldor facts' were the existence of permanent growth in the level of per-capita income and in the capital/labor ratio. In order to bypass this inconsistency with the data, exogenous technological progress was added to the model. No answer was provided however in order to explain technological progress.[1]

In contrast to the traditional theory a new literature has developed which attempts to give an answer to policy questions such as those discussed above. These contributions, dubbed 'endogenous growth theory,' fall within two well defined groups. One set has departed from the Ramsey-Solow setup in assuming a different technology. In the Ramsey model, capital accumulation responds optimally to changes in the rate of return to capital. Because of the assumption of CRS the marginal product of capital eventually falls with capital accumulation to the point where the incentive for further capital accumulation disappears. If, somehow, the rate of return to capital can remain bounded above some minimal value (the discount factor plus the rate of population growth in the neoclassical framework) then this argument would break down and capital accumulation, hence growth, could persist. Either human capital, externalities, infrastructure investment or linear production functions have been suggested as mechanisms which would generate this result. The second line of research has concentrated in understanding the determinants of technological progress. Following the lead of Denison (1962), who studied the determinants of total factor productivity, this line of research concentrates on the modeling and testing of models of R&D, learning by doing and technological diffusion. (See Arrow (1962) and Grossman and Helpman (1991), among others.)

The papers in this volume have been especially chosen because they discuss growth issues with a special emphasis on those aspects of relevance for developing countries. The volume contains papers concentrating on two topics. One set discusses the determinants of productivity growth as measured by Solow residuals and its relation to different economic variables. The second group, not completely disjoint, discusses the relation between trade and growth. We address both issues in turn.

[1] Another implication of neoclassical theory was the hypothesis of convergence in levels of income per capita. Countries with the same growth rate of population, saving rates and technology would have the same per capita output in the steady state. This seemed inconsistent with the wide disparities in income levels which are observed in the real world. Nevertheless, work by Mankiw, Romer and Weil (1992) and Barro and Sala-i-Martin (1992) tends to suggest that the extent of income level disparities are in fact consistent with the Solow model.

1. GROWTH ACCOUNTING

There is an extensive literature analyzing changes in productivity levels through the study of Solow-residuals (Solow, 1957). The Solow-residual is computed as the difference between the growth rate in output and the contribution of factors of production. It is also known as the growth rate in Total Factor Productivity (TFP). Consider a production function of the form

$$Y = T F P * F(K, L),$$

where Y denotes total output and K and L denote capital and labor respectively. By totally differentiating the production function and completing elasticities we obtain the expression.

$$\widehat{TFP} = \hat{Y} - \alpha_K \hat{K} - \alpha_L \hat{L},$$

where the hat represents a percentage variation. α_K and α_L denote the capital-output and labor-output elasticities, respectively. The residual will then reflect technological change, external economies and improvement in the quality of factors. More generally, Harberger (1990) claims this term to contain all possible forms of cost reduction.[2] Because of this complexity of factors built into the concept of TFP it becomes an important object of study.

Víctor Elías, in his paper, computes a standard measure of TFP growth for a cross section of 96 countries, showing that in most cases TFP growth is an important component of total GDP Growth. The TFP contribution ranges from negative for some developing countries to more than 50 percent for many developed economies.[3] He also shows that the rate of growth of TFP is higher in high income countries, and decreases as the level of income goes down. The result is interesting because models in which externalities are the driving force of economic growth tend to generate this correlation between increasing levels of technological progress and higher income levels.[4] Elías then proceeds to study the determinants of productivity growth by running a cross country regression between TFP and several variables. He finds that levels of educational attainment

[2] See also Denison (1962), Griliches and Jorgenson (1967), Gollop and Jorgenson (1980), Nishimizu and Robinson (1984), Fuentes (1992). For a survey of the literature see Nelson (1981).

[3] Negative growth in TFP indicates that the level of technical proficiency is decreasing, rather than increasing. In most cases this happens, not surprisingly, in countries with civil unrest and wars. A notable exception is Kuwait.

[4] However, this result is puzzling in the context of open economies even if we consider the possibility of technological difussion accesible to developing countries.

and initial backwardness (a measure of the possibility of catch-up or of technological diffusion) are important determinants of productivity growth.[5]

In his paper André Hofman also studies the growth process using the growth accounting approach for a sample of Latin American three Asian and eight more advanced countries during the 20th Century. He estimates how much of the growth rate of output can be explained by inputs, the improvement in the quality of those inputs and by TFP. He finds that technological change (measured as a the growth rate of TFP) has been more important for developed countries than for developing countries (a result similar to that found by Elías). He also shows that the improvements in the quality of the labor force has been far more important for the Asian countries than for the Latin American ones. Comparing the cases of Latin American and Asia he finds that the first group improved its relative position in per capita GDP during the first eighty years of the century and then deteriorated dramatically the during eighties. For the Asian countries the results are quite different, since their relative position improves persistently since the fifties after a long economic decline. In addition to this supply side analysis, he also discussed the effects of historical, institutional and policy factors on growth. Hofman state that Chile had a relatively poor growth performance over the last decades due mainly to very low levels of factor acumulation. However, Chile experienced a higher TFP growth rate as compared to other Latin American countries, resembling the averages in the Asian Countries he studied. Despite this, Chile still did not fare as well as the rest of the Latin American economies.

On the other hand, Rodrigo Fuentes works with data at a more disaggregated level. He compares economic policies, human capital accumulation and TFP growth rate for different industrial sectors between Korea and Singapore, over the 1963-1983 period. Both countries showed a very different pattern of TFP growth across industries and over time. While Korea's manufacturing industries experienced high growth in TFP mainly due to human capital accumulation and its export orientation, Singapore's manufacturing industries presented a low growth in total factor productivity mainly due to both low skill labor migration (that brings about a deterioration in the average quality of the labor force) and its condition as a re-export economy which, to a degree, enhance Singaporean advantages in assembly-type activities. It is also shown that the main reason for growth in Singapore was due to the factor accumulation induced by government policies rather than to gains in efficiency[6]. On the other hand, the Korean government had an active participation in terms of providing incentives for investment and exporting. This type of policy positively affected Korean firms in terms of an expansion of the average firm size and also compelled them to innovate in terms of quality and design of their products.

[5] We return to his result regarding foreign trade below.

[6] Young (1992) arrives at the same conclusion working with more aggregate data for Singapore.

While TFP growth is one of the most useful measures of technological change, important methodological questions must be tackled to obtain proper measures of TFP growth. The assumption of perfect competition embodied in the use of factor shares for the computation of the capital-output and labor-output elasticities is important among such issues. By computing the coefficients α_K and α_L through the labor and capital shares it is implicitly assumed that the production function exhibits CRS and that factor markets are perfectly competitive. Robert Hall in a series of papers (Hall 1986, 1987), has argued that this is not the case for the U.S.A. and that the computation should take into account the fact that the market structure is different from perfect competition.[7]

An additional problem exists in the measurement of the factors of production. For developed countries it is possible to obtain precise figures for employment and capital stock. Unfortunately for many developing countries such data does not exist. For many developing countries the capital stock is computed from investment figures by means of the method of perpetual inventory. The labor force is in general computed by using measures of economically active population (in some cases only total population is available) sometimes corrected by the unemployment rate.[8] Edwards and Roberts, is their paper, bear on this issue by studying the participation of women in the labor force in Latin America and analyzing how it changes with the business cycles. Changes in the labor force which are correlated with the business cycles are important because they would bias the estimates of the Solow residual if not properly accounted for. Edwards and Roberts found that for countries with low income levels a recession generates an increase in female participation in the labor force. Because most of labor flows for female are between the categories 'employment' and 'out of the labor force' (as opposed to between 'employed' and 'unemployed') it is probable that in the case of countries with low income levels, the Solow residual may be underestimated if these changes in the total size of the labor force participation are not corrected for. For example, a positive productivity shock will increase income and bring about a decline in the labor force creating an underestimation of the Solow residual if a correction is not made for this change. The pattern is the opposite for more developed countries, probably an indication that at higher levels of income the substitution effect (the lower wage obtained during a recession) more than compensates the income effect (the decrease in income bring about less consumption of leisure and more work effort). Changes in the female participation rate are probably correlated with changes in the overall size of the labor force, and because increases in output generate a decrease in the labor force

[7] He shows that the use of cost shares instead of income shares allows to take into account the possibility of imperfect competition. An alternative approach is to estimate the output elasticities econometrically, Fuentes, for example, uses this approach in his contribution to this issue.

[8] The correction for capacity utilization is much more difficult for the case of capital. Some authors for example, have used electricity consumption as a proxy for capacity utilization, which for some countries is available at the sectoral level.

participation at low income levels and an increase in labor force participation at high income levels we conclude that Solow residuals estimations which do not correct for these changes will tend to underestimate the Solow residual for countries with low income levels and to overestimate it for those with high income levels.[9]

2. GROWTH AND TRADE

The discussion of the effects of trade on economic performance has been one of the most recurrent topics in economic theory. Indeed Adam Smith (1776) and Ricardo (1817) were among the first to discuss the nature of these gains. These ideas have been formalized in the context of general equilibrium models by Romer (1986) and (1989), Grossman and Helpman (1991), Jones and Manuelli (1990), Lucas (1988) and Young (1991). In order to discuss these models, a small detour on the basics of the 'new growth theory' is useful.

2.1. New Growth Theory

Consider an economy in which the output per capita (y) equals $y = Ak^{\beta}$, with $\beta < 1$. For a constant savings rate the level of capital accumulation equals;

$$\gamma_k = \frac{\dot{k}}{k} = \frac{sy}{k} - (\delta + n) = s\,Ak^{\beta-1} - (\delta + n). \qquad (1)$$

The first term on the right hand side represents the accumulation of capital generated by savings while the second represents total depreciation in per capita terms. As long as $\gamma_k > 0$ growth persists. Notice that because $\beta < 1$ the first term will decrease as k increases and eventually growth will stop: a decreasing marginal product of capital implies that a constant savings rate cannot sustain perpetual growth. This is the same result we previously found for the Solow model.

[9] If no correction is made for the labor force but labor series are adjusted by the unemployment rate the same bias will be generated. A positive productivity shock will reduce the labor force for low income economies; this will probably be reflected in official statistics in a fall in the unemployment rate. If a correction is made for unemployment, the researcher will think that employment has increased when in reality the opposite is true again generating spurious underestimation of the Solow residual.

If the marginal product of capital is bounded above a given lower bound, then growth may persist. For example assume that the production function equals y = Ak, i.e., with constant returns to capital ($\beta = 1$). In this case (1) becomes

$$\gamma_k = \frac{\dot{k}}{k} = s\,y - \delta\,k = s\,A - (\delta + n), \qquad (2)$$

which implies that $\gamma_k > 0$ as long as $A > (\delta + n)/s$. While the formal changes between (1) and (2) are minimal the policy implications are staggering. While no parameter affected the steady state growth rate in the traditional growth models (in steady state the growth rate always equaled zero), everything does in equation (2). An increase in the savings rate or in productivity, for example, will increase the growth rate. Similarly, a decrease in population growth or in the discount factor will also increase the growth rate. Because the marginal product of capital does not fall as capital accumulation takes place, a constant savings rate can now sustain steady state growth.

All endogenous growth models somehow appeal to a mechanism similar to that in (2) by bounding the marginal product of capital above the level of the discount factor, or similarly, by bringing about constant returns to scale in the reproducible factors. As mentioned above, public investment, human capital, increased specialization, externalities, increasing returns to scale and learning by doing may be some of the mechanisms which generate this result.[10]

2.2. The Rebelo Model

The Rebelo (1991) model differs from the above description in that the saving behavior is endogenously determined as the solution of an intertemporal utility maximization problem. In short it is a Ramsey model that assumes a linear production function of the form y = Ak and therefore, it is the simplest rendition of endogenous growth models. Because growth is brought about by factor accumulation, we can disregard population growth and assume L = 1. From the solution of an intertemporal representative agent maximization problem with a time separable Constant Relative Risk Aversion (CRRA) utility function with a coefficient of relative risk aversion equal to $1/\sigma$ the dynamic equation for consumption accumulation equals.[11]

[10] See Sala-i-Martin (1990) for a review.

[11] See Blanchard and Fischer (1989) for an introduction.

$$\gamma_c = \frac{\dot{c}}{c} = \sigma\,(A - \theta).$$

As it turns out γ_c will coincide with the rate of growth of capital and output (see Sala-i-Martin, 1990). We can define the savings rate as $s_r = s/y = \dot{k}/y = (\dot{k}/k)(k/y) = \gamma_c/A$, to obtain that

$$\gamma_c = s_r A,$$

that is to say that the growth rate is proportional to savings. Note that because the problem is convex, the private return to capital coincides with its social return. This, in turn, implies that the growth path chosen by the decentralized economy corresponds to that which would be chosen by a central planner, i.e., the growth rate of the competitive equilibrium is optimal.

Because what compels agents to accumulate capital is that the rate of return is larger than their desire for current consumption, anything that changes this rate of return will affect savings and growth. Income taxes, at a rate τ for example, will reduce the marginal product of capital form A to $A(1 - \tau)$ and consequently reduce growth. A consumption tax, on the contrary, does not affect the relative return to capital (it just increases the relative cost of consumption) and therefore will not affect the growth rate. Trade liberalization will generate an improvement in the allocation efficiency of the economy which will increase the productivity of capital and bring about a higher growth rate.

Because almost anything can affect productivity -social norms, financial institutions, the inflation rate, technological development, etc., the Rebelo model becomes subject to an *embarrassment of riches*: almost anything affects growth.

2.3. Adam Smith's division of labor

The Rebelo model can be easily extended to capture Adam Smith's idea of increased specialization as a driving force of the growth process. Consider an economy with a production function equal to

$$Y = L^{1-\alpha} \int_0^{\infty} X\,(i)^{\alpha}\,di, \tag{3}$$

where x(i) stands for a particular set of intermediate inputs. If the production of these intermediate inputs requires a fixed cost investment, then the economy will not produce the infinite varieties of intermediate inputs but a smaller subset, without loss of generality, those in the interval [0, M]. Due to symmetry we can assume that the M varieties will be produced in quantity Z/M where Z is the total amount of resources devoted to the production of intermediate inputs. If so we can substitute in (3) to obtain

$$Y = L^{1-\alpha} M (Z/M)^{\alpha} = L^{1-\alpha} Z^{\alpha} M^{1-\alpha}$$

Notice that the number of varieties M appears as an argument of the production function: a higher number of varieties allows for higher production levels for the same amount of resources. If we renormalize units so that Z = M we obtain the production function

$$Y = L^{1-\alpha} M,$$

which is linear in M. In order to increase the number of types we must incur the fixed cost. Therefore,

$$\dot{M} = k (Y - c).$$

Notice that this problem is isomorphic to Rebelo's, and therefore perpetual growth is feasible here as well. The driving force of growth is an externality, by virtue of which, whenever the set of varieties expands, the productivity of all existing intermediate inputs increases, therefore maintaining the incentive to introduce additional varieties always positive.

Contrary to the Rebelo model in this setup there will be a difference between the competitive equilibrium and the central planner's solution. Because firms take into account only the private productivity of capital without internalizing the fact that they increase the economy-wide number of different inputs (therefore enhancing the productivity of other firms), the incentives to invest in the competitive equilibrium are lower than those perceived by a social planner and the decentralized economy growth rate will be lower than optimal.

The relation between the model and trade is straightforward because trade increases the number of varieties used in the production process (most of world

trade is intra-industry trade). The above formalization captures, in a very simple setup, the original intuition of Adam Smith in which an increase in types allows for improved efficiency and persistent growth.

2.4. Trade and growth

In addition to the Adam Smith mechanism by which trade induces growth, some researchers have concentrated in the study of diffusion of knowledge, which is probably the most important way in which technology is transmitted across countries. Whether and how this diffusion is related to trade is an open empirical question, though the experience of former socialist economies tends to suggest that only active insertion in world markets allows to assimilate the technological changes which take place in other countries. Edwards (1991) introduces the notion of 'learning by looking,' in which trade has to take place for diffusion of knowledge to be possible. Suh (1993) seems to validate this idea by showing, for a cross section of Korean firms, that diffusion (the purchase of patents for a particular production process) in quicker in those sectors related to trade.

Grossman and Helpman (1991) review other reasons why trade and growth may be related. In a small open economy they argue that the results will depend on whether trade generates a reallocation of production towards goods which use intensively the factors of production used in R&D, though because many developing countries do not spend much resources in R&D, this channel should be relatively unimportant. Additional mechanisms by which trade affects growth include avoiding unnecessary duplication of research efforts and increased incentives derived from the access to a larger market.

Models generating the opposite results have been suggested, i.e., in which trade reduces growth and potentially welfare. Alwyn Young (1991), for example, discusses an economy which can produce goods in which learning is still taking place ('advanced' or 'new' commodities) or more backward goods in which learning has already been exhausted. He shows that in general less developed economies will tend to have a comparative advantage in goods with relatively little learning and therefore will experience lower rates of technological progress after opening up to trade. In Young (1992) he shows that Singapore, for example, experienced very little productivity growth in TFP and explains this as due to the pervasive intervention of the government in diverting the production structure towards these backward commodities. Grossman and Helpman (1991) consider how trade may reduce R&D in countries which have comparative advantage in the production of goods intensive in human capital. By increasing the relative return to human capital the incentive to engage in R&D may decline. These arguments resemble the literature on 'import substitution' growth strategies which assumed that closing the economy would allow the economy to increase its

production of goods with higher levels of productivity growth. Nevertheless, even if a country does not specialize under free trade in goods which are characterized by higher learning and, consequently, higher growth rates, this does not imply that welfare will decline. The country can appropriate the benefits of technological progress taking place in the foreign country through purchases of the now probably cheaper foreign commodity in world markets. In some cases, though, because of multiple equilibria (Murphy, Shleifer and Vishny (1989), Rodríguez (1992)), or because comparative advantages are dynamic (Lucas (1988) and Krugman (1987)), trade restrictions could eventually be welfare improving.

As is clear from the previous partial review, the relation between trade and growth remains theoretically ambiguous so that its overall impact remains an open empirical question.[12] Balassa (1978, 1988) and Ram (1987) study the correlation between export growth and the growth rate of GDP. However, the way that these authors try to prove the value of outward orientation is just through an econometric analysis which has many problems from a statistical point of view. It seems reasonable to have a high correlation between the growth rate of exports and the growth rate of output (as the later is a component of the former), so whenever you add this variable to an equation explaining output growth the determination coefficient is bound to increase. To conclude from this fact that the outward orientation is successful seems to be weak. Concerning the issue of government intervention, Harberger (1984) summarized a country-case study of economic development. His conclusions can be summarized as keep the 'right' relative prices, keep the government intervention in the economy 'under control' and take advantage of international trade. Edwards (1991) provides the most comprehensive study of the relation between trade and growth. Using nine alternative indicators of trade orientation Edwards finds that more open economies will tend to grow faster than economies with trade distortions. His indicators include not only measures of trade but also the deviations from the amount of trade predicted by Leamer's Hecksher-Ohlin empirical model (Leamer, 1988). Edwards shows that the results are robust to the method of estimation, to correction for errors in variables and for the deletion of outliers.

Fuentes, in his paper, also discusses the role of international trade for the countries under analysis, given that the overall incentives in those economies favor the production for international markets. This trade strategy seemed to be good for Korea, since there was an increase in the firm's average size in the more dynamic sectors and a technological progress generated by foreign competition. In the case of Singapore, trade was of the re-export type which tends to leave little room for productivity increases. The main force in Singapore's growth seems to be the high investment rate in the exportable sector.

[12] See, for example, Harberger (1984), Krueger (1978), Edwards (1989).

Elías constructs a measure of trade as the average annual rate of growth of export plus imports times the average share of exports on the GDP. He shows this variable to have an non-significant effect on the growth of TFP. Holger Wolf, on the contrary does not rely on TFP measures to assess the importance or benefits of trade in his paper. He takes a much more direct approach. First the constructs a measure of trade distortion, by computing the deviations of exports and import levels from those predicted by a factor endowment model. He shows that the resulting index is robust to a series of intuitive tests. He then introduces these deviations in growth regressions to show that growth increases with increased exports orientation (a positive residual in the factor endowment regression, i.e., that the country exports more than it should) but that it decreases with import orientation. This result is even more interesting when both effects are taken together; an equal percentage increase in the export and import orientation reduces growth for low income countries but increases the growth rate for high income countries[13]. These results are an interesting compromise between the two theoretical reviews discussed above.

3. POLITICAL FACTORS AND GROWTH

Are democracies good for growth? How does the interplay of interest groups affect the growth performance of an economy? These questions correspond to a rapidly growing literature which analyzes the relation between institutions and economic growth. The topic is nevertheless not new; the importance of property rights, for example, has always been recognized as a necessary condition for sustained growth.[14]

A portion of this literature emphasizes the time inconsistency problems generated by income distribution struggles or government action. Alesina and Rodrik (1991) and Persson and Tabellini (1991), for example, show that the higher the income inequality is, the more radical the policies of redistribution and, consequently, the lower the net return to capital and, hence, growth.

Sapelli, in his paper, discusses the problem created by the existence of predatory government behavior. He discusses how countries may be induced to engage in time paths where excessive 'predation' is anticipated by investors, therefore reducing the return to capital and growth. He suggests that financial donors can play the role of insuring that the incentives to carry out structural adjustment programs (which he identifies with efficient government policies associated to low levels of distortions and high growth) remain sufficiently high.

[13] Because Edwards (1991) studied a sample of only 30 developing countries, Wolf's results for low income countries tends to suggest that his results may not be robust to an extension of the sample set.

[14] See Scully (1988) and Barro (1991) who finds a negative association between growth rates and the level of political distress. On the political system and growth see Alesina et. a. (1991). For a theoretical model see Sturzenegger and Tommasi (1993).

By making loan disbursements 'conditional' to the sustaining of reforms, the incentives of policy makers can be made more compatible with social welfare. Sapelli, therefore, attaches an important role to financial institutions for the current success of structural reform in many developing countries. In the same line he argues that 'conservative' policy makers may be the best suited to carry forward those economic reforms.

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