New Growth Theory: A Survey from a Policy Perspective

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Economic growth is once more a hot topic. There are several reasons for this resurgence. First, traditional short-run or cyclical macroeconomics has suffered an intellectual decline because stabilization policies have turned out to be less successful than were advertised by Keynesian economics. Second, the gains from understanding the determinants of economic growth are a multiple of the gains from an equivalent understanding of business cycle fluctuations. In particular, economic growth rates around the world continue to differ and economics needs to provide an explanation for such differences. Third, the renewed interest in industrial organization has encouraged macroeconomists to study the link between market structure and economic growth. Of special importance is the relationship between growth and the country's openness to international trade. Finally, the resurgence of interest in economic growth has coincided with bold experiments around the world that have been undertaken with the expressed purpose of raising economic performance: the process of deep economic integration in the European Union, the formation of a free trade area in North America, the disintegration of planned socialist economies and their transformation in market economies, and stabilization-cum-privatization programs in countries such as Argentina, Chile, and Mexico. All of these experiments have been "sold" not in terms of once-for-all increases in output but as means to raise permanently the economic growth rate.

The objective of this paper is to first survey what we have learned from growth theory, and then apply these lessons to problems of economic development. Our intention of this survey is from a policy perspective.

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I. Stylized facts and neoclassical growth theory

There are several observations about economic growth that deserve the label of stylized facts.[1] The first and most lasting fact is that output per manhour or labor productivity (Y/L) has grown secularly. Table 1, taken from *Maddison* (1982), identifies the country with the highest value of Y/L during successive historical periods from 1700 to 1970. The trend is clearly positive.[2] Table 2, also from *Maddison* (1982), confirms the upward trend in the growth rate of labor productivity but also shows that there is a wide variation in these rates among 16 developed economies. These long-run trends, it is worth emphasizing, are consistent with reversals that can last several years. For example, there is a vast literature on the productivity slowdown of the 1970s in the OECD countries, the causes of which are still nebulous (*Shigehara* 1992).

Table 1

Labor productivity growth rates in three advanced countries

Leading countries	Interval	Average annual growth rate of GDP per man-hour (%)
Netherlands	1700 - 1785	−0.07
United Kingdom	1785 - 1820	0.5
United Kingdom	1820 - 1890	1.4
United States	1890 - 1970	2.3

Source: *Maddison* (1982) and *Romer* (1989a).

The second stylized fact is that in the neoclassical *Solow* (1956) model changes in the capital to labor ratio (K/L) explain very little of the changes in Y/L. This is due to the rapidly diminishing returns of capital. To see this point, let us write the textbook version of the *Solow* production function:

$$\frac{Y_t}{L_t} = A_t \left(\frac{K_t}{L_t}\right)^{\alpha}, \tag{1}$$

[1] Our list of stylized facts is not meant to be exhaustive; rather it reflects our judgement about what empirical findings are most salient.

[2] See also *Jorgenson* (1988), *Romer* (1986, 1989a), and *Scott* (1989).

Table 2

Labor productivity growth rates in leading countries

Countries	Output per man-hour		Ratio (1979/1870)
	1870	1979	
Australia	1.30	6.5	5
Austria	0.43	5.9	14
Belgium	0.74	7.3	10
Canada	0.64	7.0	11
Denmark	0.44	5.3	12
Finland	0.29	5.3	18
France	0.42	7.1	17
Germany	0.43	6.9	16
Italy	0.44	5.8	13
Japan	0.17	4.4	26
Netherlands	0.74	7.5	10
Norway	0.40	6.7	17
Sweden	0.31	6.7	22
Switzerland	0.55	5.1	9
United Kingdom	0.80	5.5	7
United States	0.70	8.3	12

Source: *Maddison* (1982) and *Romer* (1989a).

where A denotes total factor productivity or the Solow residual and α is the share of capital in total income. The estimates of alpha for individual countries range from 0.25 to 0.4 (see Table 3); however, 0.3 represents the best estimate across countries (*Mankiw* et al. 1992, p. 420). According to the data compiled by *Summers* and *Heston* (1991), in 1988 the United States had a value of Y/L and K/L 18.2 and 20.5, respectively, times that of India. Using a value of $\alpha = 0.3$ and ignoring A, if India had the U.S. capital to labor ratio its output per manhour would have been 2.5 times its actual one. That is, the bulk of the variation in Y/L cannot be explained by capital accumulation.

The third fact is that growth rates of Y/L are persistently different among countries (*Baumol* 1986; *Denison* 1966; *Summers* and *Heston* 1988). *Plosser* (1992), using data from 97 countries over the period 1960 - 89, reports a positive correlation between growth and 1960 real

Table 3

Estimates of the share of capital in total income

Countries	Interval	Share of capital (%)	Reference
Japan	1913 - 1938	40	*Ohkawa* and *Rosovsky* (1973)
	1954 - 1964	31	
United Kingdom	1856 - 1873	41	*Mattews, Feinstein,* and
	1873 - 1913	43	*Odling-Smee* (1982)
	1913 - 1951	33	
	1951 - 1973	27	
United States	1899 - 1919	35	*Kendrick* (1961)
	1919 - 1953	25	
	1929 - 1935	29	*Kendrick* (1973)

Source: *Maddison* (1987) and *Romer* (1989a).

per-capita income, evidence that standards of living are diverging between rich and poor countries (Table 4, last row).

Solow's model predicts, instead, that growth rates ought to converge if countries have the same "fundamentals". To explore this issue in more detail, consider that investment will add to K/L only after the capital stock has grown sufficiently to maintain all workers with the same amount of capital and has replaced worn-out capital:

$$i_t = \dot{k}_t + (n + \delta)k_t \tag{2}$$

where the lower-case k indicates the ratio of capital to labor, n is the growth of employment and δ is the rate of depreciation. Assuming a closed economy, investment will be determined by the saving rate, s, times real income. Hence, capital accumulation will be yielding a steady-state value of the capital to labor ratio:

$$\bar{k} = \left(\frac{sA}{n + \delta}\right)^{\frac{1}{1-\alpha}}. \tag{3}$$

Two countries with the same A and $\bar{k}$ but different k will have converging growth rates, with the country with the smaller k growing faster than the country with the higher k. That is, we would expect a group

of countries with the same "fundamentals" like the G-7 (U.S., Canada, Japan, U.K., France, Germany and Italy) to have converging growth rates. Indeed, there is evidence that the higher growth rates of France, Germany, Italy and Japan after World War II are slowing down and are converging to those of the United States. An implication of the Solow model is that convergence takes time. *Mankiw* et al. (1992, p.423) estimate that a country approaches its steady state equilibrium at a rate of 2 to 4 per cent a year.[3] A higher propensity to save raises $\bar{k}$ and generates higher growth until the economy reaches a new steady state. The observed positive correlation between the investment share of GDP and the growth rate of real GDP (see Table 4, second row) may result from different dynamic paths to different steady state values of k.

It is interesting to note that the facts about the relative growth rates of the countries in the G-7 group have led some observers – e.g., the historian Paul *Kennedy* (1987) – to conclude that the U.S. is a declining economic power. The Solow model, instead, implies that countries whose capital stock was largely destroyed during World War II were bound to grow faster than the United States and the United Kingdom, whose capital stock was marginally affected by the conflict. Hence, there is little merit in the declinist view of the United States, the correct interpretation being that France, Germany, Italy and Japan were catching up to the United States.

The fourth fact is that technological changes play a bigger role in the growth process than capital accumulation (*Solow* 1957; *Maddison* 1987). Furthermore, productivity growth correlates positively with the stock of human capital (*Baumol* et al. 1989; *Barro* 1989; *Romer* 1989b; and *Azariades* and *Drazen* 1990). Human capital is an input that received no attention in the neoclassical growth model, but instead is at center stage in the new growth theory. Table 4 shows that growth and education are positively related.

The fifth fact is that population growth is a deterrent to economic growth (*Summers* and *Heston* 1988; Table 4). This is also a prediction of the Solow model in the sense that the steady-state value of k is negatively related to n. If we add that population growth is higher in poor countries than in rich countries, we obtain the implication that high birth rates is a cause of the diverging standards of living between rich

[3] The estimate of 2 per cent a year is derived from a production function that excludes human capital, whereas the 4 per cent estimate comes from a production function that includes human capital.

and poor countries. While these results do not vindicate *Malthus's* (1798, p.7) prediction that "the power of population is indefinitely greater than the power in the earth to produce subsistence for man", diverging standards of living can be a source of destabilization (*Kennedy* 1993).

Table 4

Growth Characteristics of a Cross-Section of Countries

	Overall average $n = 97$	Slow growth < 0.5% $n = 23$	Fast Growth > 3.5% $n = 14$	Correlation with GDP growth rate
Real per Capita GDP growth 1960 - 89	2.03%	−0.26%	4.88%	1.00
Investment share of GDP	0.21	0.17	0.26	0.61
Government consumption share of GDP	0.15	0.15	0.14	0.10
Inflation rate	23.00%	42.11%	7.90%	−0.17
Standard deviation of inflation rate	52.38	137.19	5.68	−0.16
Exports as a share of GDP	0.28	0.24	0.35	0.30
Import as a share of GDP	0.33	0.30	0.40	0.31
Secondary school enrollment rates 1960	0.21	0.06	0.34	0.41
Primary school enrollment rates 1960	0.74	0.44	0.98	0.54
Population growth	2.06%	2.55%	1.26%	−0.36
Revolutions and coups per year	0.20	0.35	0.12	−0.37
Real per capita GDP in 1960	$1840	$889	$1968	0.20

Source: *Plosser* (1992).

The sixth and final fact points to the important relationship between growth performance and government policy. There are several aspects in this relationship. To begin with, an environment of macroeconomic stability fosters economic growth (*De Long* and *Summers* 1992), a theme to which we shall return in a later section. Secondly, a policy that promotes economic openness fosters growth relative to a protectionist policy (*Krueger* 1978; *Maddison* 1982; World Bank 1987; *Kuznets* 1988; Table 4). Over time and across countries, income growth and trade growth are always positively correlated, with trade growth varying more than income growth. Thirdly, countries with high shares of government consumption in GDP tend to grow more slowly, while those with high rates of government investment tend to grow more rapidly (*Landau* 1983;

Barro 1989, 1990). Finally, output growth is negatively correlated with marginal tax rates (*Koester* and *Kormendy* 1989).

II. New growth theory

Economic growth cannot be explained by capital accumulation: the property of rapidly diminishing returns limits severely the contribution of capital to the growth process. The latter in the neoclassical growth model takes place because of an exogenously given technical progress. To produce growth that is not dependent on exogenous forces, that is to have an endogenous growth, one needs to relax the diminishing returns assumption. One way to do is to introduce externalities and spillover effects (e.g., learning-by-doing and innovations).

Technology receives particular attention in this literature. Technology cannot be equated to a public good if it is used as an input in the production process. Indeed, when someone uses a specific technology to produce a good or a service, that technology can be used by others but not free of charge. The cost of using a given technique can either be a patent fee or the cost of imitation. In contrast, in a public goods environment individuals would free ride. Of course, patents or copyrights need to be fully enforced and, as a result, one can reap the benefit of innovations without incurring a charge. In this case there are spillover effects.

1. Spillovers and human capital

An important aspect of the new growth theory is the emphasis on human capital, which is considered more important than investment in plants and equipment. Because of spillover effects, social returns on R&D (research and development) are much larger than private returns. It follows that, in the absence of a planner that closes the gap between social and private returns, a competitive equilibrium implies a sub-optimal accumulation of human capital. A subsidy to knowledge acquisition can lead to higher growth.

The fundamental contributions in this field are those by *Romer* (1986) and *Lucas* (1988), both of which based on *Arrow's* (1962) theory of learning by doing. However, the idea that increasing returns are central to the explanation of long-run growth is at least as old as Adam *Smith,* and includes economists such as *Marshall, Hicks, Kaldor,* and *Knight.* Before the 1960s, however, only static models of increasing returns with exter-

nalities were developed and these were widely used in international trade because of their relative technical simplicities.

The dynamic models of growth driven by increasing returns was sparked by *Arrow*'s (1962) principle of learning by doing. *Romer* is motivated by the positive association between productivity growth and rising per-capita income. In the model he constructs knowledge is a capital good with an increasing marginal product; production of the consumption good is convex and is a function of the stock of knowledge. R&D has the property of diminishing return, and consequently a maximum technologically feasible growth per capita output exists and, more importantly, the output growth rate may be monotonically increasing but does not exceed its upper bound. An equilibrium is calculated not by solving a social planner's problem, but rather by relying on an individual who takes as given the path of some exogenously determined aggregate variables. Therefore, Romer's solution can be interpreted either as the solution of a dynamic model with conventional externality, or the solution of perfect foresight (which Lucas likes best), or the solution of a symmetric Nash equilibrium for dynamic game (which, of course, game theorists like best). The externality implies that the stock of knowledge is under provided.

Lucas is motivated by the fact that real GDP growth rates across developed and developing countries do not converge. To provide a solution Lucas builds three models: the first emphasizing capital accumulation and technological change, the second human capital accumulation through schooling, and the third human capital accumulation through learning-by-doing.

From the first model Lucas concludes that the neoclassic model is not a useful theory of economic development because it fails to explain differences in economic growth rates and because the prediction that international trade should lead to convergent K/L and factor prices is refuted by the facts. In the second model, Lucas adds human capital, which is accumulated through schooling and enhances productivity. By individual's "human capital", Lucas means that a worker with human capital $h(t)$ is the productive equivalent of two workers with 0.5 $h(t)$ each, or a half time worker with 2 $h(t)$. The other capital in this model is physical capital that is accumulated and utilized in production under familiar neoclassical methods.

Economies that are initially poor remain so, although their long-run rate of income growth is the same as that of initially wealthier econo-

mies. Diversified growth rates in the whole world become possible in this model. In addition, if trade in capital goods is introduced, there will be no tendency to trade if labor is immobile, or the model can predict that under certain conditions, labor will migrate from poor to rich countries if labor is mobile. In contrast with the first model – the neoclassical model – the second model produces a pattern that is consistent with sustained growth and with sustained diversity in income levels, and predicts that international trade should not induce rapid movement toward equality in capital-labor ratios and factor prices. However, this model is not able to account for observed diversity across countries or over time within a country.

In the third model, Lucas emphasizes human capital accumulation through learning-by-doing. If different goods are taken to have different potentials for human capital growth, then the same considerations of comparative advantage that determine which goods get produced where will also dictate each country's rate of human capital growth. As a result, this model admits the possibility of wide and sustained differences in growth rates across countries.

2. *Labor specialization*

The latest contributions in this field have tried to explain economic growth in terms of labor specialization. While this theme is as old as Adam Smith's example of the pin factory, the new models are searching for the reasons underlying labor specialization and the link between specialization and economic growth. For example, in *Borland* and *Yang* (1992) specialization is limited by transaction costs and returns to specialization. Deeper specialization, in turn, leads to a higher output per capita, an enlargement of trade opportunities and market size, and to a new round of (endogenous) labor specialization. Inter-country differences in output growth rates can persist.

Kim and *Mohtadi* (1992) emphasize instead the difference between intensive and extensive human capital. Intensive human capital affects productivity in a given job; extensive human capital affects the worker's adaptability to different jobs. While an individual with a higher ratio of intensive to extensive human capital has a higher productivity on the existing job than a generalist, he faces a lower probability of finding another job earning the same wage rate. Here one can explain different transitional dynamics across countries which differ only by initial levels of human capital, but not permanent differences in growth rates unless

other fundamental factors differ as well. As in the original Solow model, differences in the initial level of capital imply different paths to steady state but not different steady states.

3. *Constant returns to scale to composite capital*

Endogenous growth results need to rely on increasing returns to scale. The model by *Rebelo* (1991) generates endogenous growth using a production function which displays constant returns to scale to a composite input of physical and human capital. Equation (2) in the text becomes simply

$$\dot{k}_t/k_t = sA_t - (n + \delta), \tag{4}$$

and the accumulation of the composite input does not go to zero unless the saving rate times A equals the sum of population growth and the depreciation rate. The composite input will grow faster the higher s and the lower n and δ. Models of this kind make very obvious the link between government policy and the nation's ability to grow. Government policies that lower the incentives to save and invest affect growth negatively. Rebelo works out a specific solution where a tax on investment lowers the nation's growth rate, wheras a tax on consumption does not. A tax on income, which taxes both consumption and investment, will also have negative implications for economic growth.

4. *Endogenous growth and international trade*

Traditional trade theory provides a clear analysis of the static gains from trade and losses from protection, but does not indicate the dynamic effects of international trade on growth, technical progress and welfare. The reason for this is that in the neoclassical growth theory the principal engine of growth is exogenous technical change. The so-called new trade theory – see, for example, *Grossman* and *Helpman* (1988, 1989) – builds on the works by *Romer* (1986, 1987, 1990), *Lucas* (1988) and *Prescott* and *Boyd* (1987). In Grossman and Helpman's models, the endogenous growth is generated either by the development of new varieties of intermediate or final goods or by the improvement of an existing set of goods; these models relate the dynamic effects of various economic policies to their impact on R&D efforts of two trading economies.

Alwyn *Young* (1991) investigates international trade based on an endogenous growth model with feature of learning by doing. The learning-by-

doing model in this paper incorporates two important facts provided by industrial level analyses of technical progress: the substantial spillover effects in the development of knowledge across industries and the strong diminishing return in the learning-by-doing process. Knowledge generated by learning-by-doing is in the public domain, that is it is nonappropriable by the firms engaged in the production. Labor is the sole factor in production. The equilibrium output of perfectly competitive firms endogenously determine the evolution through time of a function describing the unit output labor requirements of each of the goods. At any given time, the learning-by-doing has been exhausted in a subset of goods, but continues in the rest. Based on some assumptions, an unbounded growth is ensured by the nature of preference and learning-by-doing.

The result from Young indicates that under free trade, LDC experiences rate of technological progress less or equal to those under autarky while DC experiences rate of technological progress greater or equal to those under autarky (there are only two countries included in the model). If the DC's working population is greater than or equal to that of the LCD, the technical gap between the two economies will increase without bond. In addition, even the LDC has a population several orders of magnitude greater than that of DC's, if the initial technical gap between the two economies is large enough, the LDC will never catch up with its trading partner. The model of this paper also indicates that free trade will tend to raise the rate of GDP growth of the DC and lower that of LDC. As a result, trade does not accelerate the growth of national income in all trading economies. The prediction of intertemporal welfare for LDC is ambiguous: although the LDC enjoys static gain from trade, it suffers a decrease in its rate of technical progress, the outcome of these two opposite results is unclear. DC enjoys both the static gain from trade and increasing rate of technical progress and its consumers can generally enjoy an unambiguous increase in intertemporal utility.

Luis *Rivera-Ratiz* and Paul *Romer* (1991) explore the relationship between economic growth and international trade when two countries integrate. To abstract from the other "comparative advantage" effects that trade may induce, the two authors consider integration only between similar countries. Output is a function of human capital, labor, and a set of capital goods. There are three types of production: consumption goods, capital goods, and R&D which creates "designs for new capital goods". R&D is driven by either pure knowledge or by lab equipment.

When R&D is knowledge-driven, flows of goods unaccompanied by flows of ideas have an effect on the level of output but not on the long-

run economic growth rate, because free trade in goods does not affect the mix of human capital in manufacturing and research. If instead flows of goods and ideas go together there is a permanent effect on the economic growth rate of the economy. The reason is that the inflows of ideas can be used in research in each country, raising the productivity of human capital in research relative to manufacturing. This, in turn, induces a shift of human capital from manufacturing to R&D, and consequently a rise in the permanent growth rate. It should be noted that, without trade in goods, there would be no incentives for researchers in different countries to specialize in different designs.[4]

Economies of scale also play a role in this paper. First, there is a fixed cost required to design a new product. With integration, this cost is incurred only once; that is, integration yields makes it redundant for one country to rediscover what has already been discovered by the other country. In sum, economic integration between two advanced and similar economies can lead to a permanent boost in economic growth.[5]

Grossman and *Helpman* (1991b) explore the process of endogenous innovation and imitation in a two-country model, where there is an advanced country (in the north) which brings the next generation of technology-intensive products through market competition and a middle-income country (in the south) invests to learn the production process in order to imitate. The phenomenon of quality ladders emerges because the initial high-quality products are invented or upgraded and produced by firms in the north, but firms in the south can learn the production process and produce the imitated products of low quality. The firms in the north want to invest in innovation because they can enjoy monopolistic profit before imitation takes place. Firms in the south have incentives to imitate simply because they are not able to innovate and produce high quality products but they can earn monopolistic profit through imitation and selling the product at a lower price (due to their low manufacturing cost).[6]

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[4] Based on the lab equipment model, however, this paper shows that ideas have no effect on growth, but trade in goods can cause a permanent increase in growth rate.

[5] This result can be compared with trade between an advanced and a developing economy analyzed by *Young* (1991), where the intertemporal welfare implications of the consumers of the developing economy are ambiguous unlike those of the consumers of the advanced country.

[6] An example of "quality ladders" is the personal computer, where the leading firms in the north (IBM in the U.S.) innovated and firms in the south (South Korea and Taiwan) imitated and produced lower-quality compatible.

The steady-state equilibrium in this paper indicates that there are ongoing product upgrading and product cycles. Although each product has different cycle, in the aggregate the average rates of innovation and imitation are constant in steady state. An interesting policy implications is that the north's government policy to promote innovation causes the steady-state goods' flows from north to south to decline, while the south's government policy to subsidize imitation causes a decline in the average rate at which goods climb quality ladders.

5. *Recent empirical evidence*

Barro (1991) presents evidence on the determinants of economic growth using data from 98 countries for the period of 1960 - 1985.[7] The growth rate of real per capita GDP is found to be positively related to the initial stock of human capital, which is proxied by 1960 school enrollment rates, and negatively to the initial level of real per capita GDP. This result seems to support the convergence hypothesis of neo-classical growth theory, implying that a poor country tends to grow faster than a rich country. However, this result only holds for a given amount of human capital.

Barro also finds that countries with higher human capital have lower fertility rates, which has been predicted by growth models with endogenous fertility rate such as *Barro* and *Becker* (1989) and *Becker, Murphy* and *Tamura* (1990). Countries with higher human capital have higher ratios of physical investment to GDP, which is also a well known prediction from endogenous growth models such as *Rebelo* (1991) and *Barro* (1990). The underlying reason is that people shift from saving in the form of children to saving in the form of physical and human capital.

Furthermore, growth is inversely related to the share of government consumption in GDP, a confirmation of an earlier finding (*Barro* 1989, 1990). The underlying reasoning is that government consumption lowers saving, and hence growth, through the distorting effects from taxation or government expenditure programs. Finally, growth is insignificantly related to the share of public investment, positively related to political stability and inversely related to market distortions.

De Long and *Summers* (1991) challenge the implication of the new growth theory regarding human capital accumulation. Their evidence

[7] The data come from *Summers* and *Heston* (1988), the United Nations, the World Bank and Banks (1979).

supports the old and traditional view that the accumulation of machinery is a primary determinant of productivity growth. Using data from a sample of high-productivity countries with 1960 levels of GDP per worker 25 per cent greater than that of the United States, they find that an increase in one point in the share of GDP devoted to equipment investment leads to an increase in the growth of GDP per worker of 0.337 per cent per year. Equipment investment is found to have far more explanatory power on productivity growth than any other component of investment. What needs to be resolved is whether the causality runs from equipment investment to productivity growth or the other way around.

A case often cited against the position that high investment has a high marginal product and hence is the key to growth is India (*Krueger,* 1990). Krueger estimates that after independence saving rates in India rose from 14 to 22 per cent, yet India had a poor growth performance. De Long and Summers explain these facts by low equipment investments, caused by very high relative prices relative to comparable countries. In sum, what counts is not so much the saving rate rare but the way saving is invested.

Murphy, Shleifer and *Vishny* (1991) focus on the allocation on human capital, rather than on its quantity, to explain economic growth. If a country's most talented people become wealth producers, economic growth rises; if they become rent seekers, growth is reduced. The factors which determine the attractiveness of an occupation to talent include the size of the market, firm size, and most importantly the compensation contract. In the cross-country regression, engineers (wealth producers) have positive and significant effects on growth, while lawyers (rent seekers) have an insignificant effect on growth. The reader is led to make the obvious comparison between the recent explosion of lawyers in the United States and its productivity slowdown.

Mankiw et al. (1992) argue that the Solow model, suitably modified to include human capital, explains well international differences in per capita output. The starting point of the modified model is

$$y_t = (k_t)^a h_t^\beta, \tag{5}$$

where k = K/AL and h = H/AL, H = stock of human capital. The testable implication is:

$$\ln y_t = \ln A(0) + gt - \frac{\alpha + \beta}{1 - \alpha - \beta} \ln (n + g + \delta) + \frac{\alpha}{1 - \alpha - \beta} \ln(s_k) + \frac{\beta}{1 - \alpha - \beta} \ln(s_k). \tag{6}$$

The parameter g is the growth rate of A. The sum of $g + \delta$ was set to 0.05. The two s represent the national propensities to invest in physical and human capital, respectively. The first propensity is proxied by the ratio of investment to GDP; the second propensity by the proportion of the working-age population in secondary school. Except for s_h, all other data come from *Summers* and *Heston* (1988). The sample consist of 98 observations from non-oil producing countries in 1985. The regression explains 80 per cent of the cross-country differences in y, and human capital is a very important determinant of these differences. The implied estimated values of alpha and beta are approximately 0.3, suggesting that labor share in total income is 0.4 across the 98 countries. Since the variation in the measured s_h is very wide, industrial countries such as those in the G7 will have larger shares of human capital in national income. *Mankiw* (1992, p. 89) suggests that the U.S. beta is almost one-half. In sum, the combined capital accounts for the bulk of the share of national income. The strongly diminishing returns of the original Solow model are replaced by the mildly diminishing returns of the modified model. Differences in saving and investment in both physical and human capital can explain persistent national differences in economic growth rates.

III. Strategies for economic growth

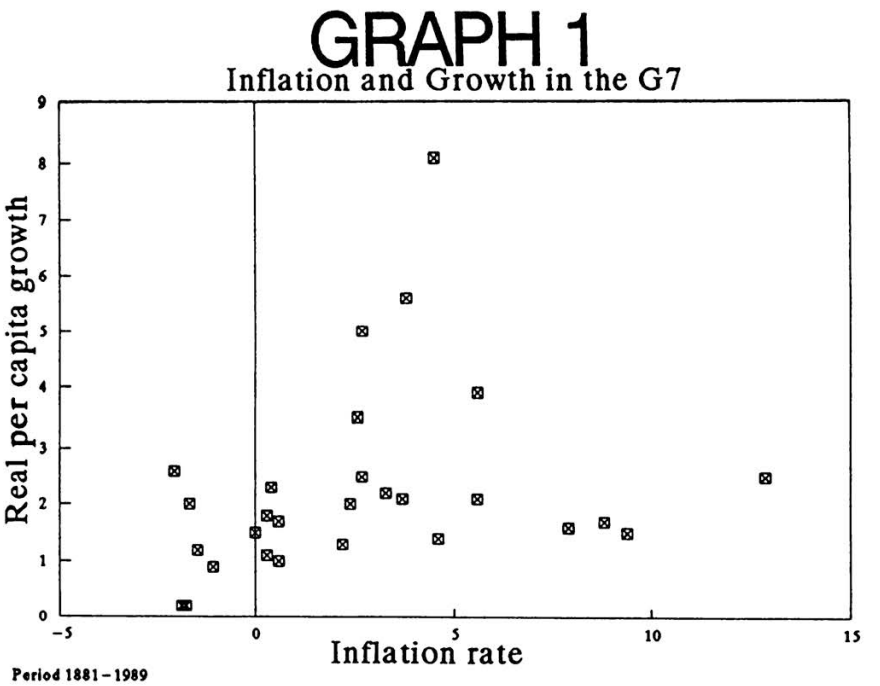
What lessons can we draw from the literature for improving economic performance and reducing the wide disparities in standards of living existing in the world? Jacob Frenkel, the Governor of the Bank of Israel. in an "overview" comment to a symposium on economic growth (1992, p. 239) put it very aptly that economic growth cannot be divorced from macroeconomic stabilization. The analogy used by Frenkel is that of a "two-stage rocket, where the first stage is stabilization and the second stage is growth." In deference to this analogy, we will first take up the macroeconomic implications and subsequently the microeconomic implications of the growth literature.

1. Macroeconomic implications

It is well accepted by now that bouts of inflation may rise output and lower unemployment over the short term but cannot influence trend economic performance. There is still some debate whether inflation is bad for trend economic growth. The models presented in the previous sections do not include monetary variables and, thus, cannot shed light on the relationship between inflation and trend growth. *De Gregorio* (1992) introduces money in a Romer-type (1986) growth model. Money facilitates transactions. An increase in the rate of inflation lowers the demand for real money balances, making consumption more expensive relative to leisure. Hence, a higher inflation lowers the supply of labor. On the other hand, a higher inflation lowers the demand for labor because of the negative impact of inflation on the real rate of return. The combined effect is a reduction in employment and a decrease in the output growth. In essence, inflation redirects inputs from productive to transaction activities. Using panel data from 12 Latin American countries over the period 1950 - 85, De Gregorio finds a negative correlation between output growth and inflation, after allowance is made for investment flows, literacy, and government consumption.

Additional evidence comes from De Long and Summers (1992) who find that a higher inflation lowers the average growth rate of real per capita income, after controlling for central bank independence. In his comment to the paper, *Meltzer* (1992) considers the findings very implausible and inconsistent with historical evidence. So what is the long-run relationship between inflation and economic growth, allowing for differences in central bank reputation?

Graph 1 plots the relationship between inflation and per capita output growth from 1881 to 1989 for the G7 group of countries (*Bordo* 1992). Four separate regimes are considered: the gold standard from 1881 to 1913 with low average inflation and high central bank reputation, the inter-war period from 1919 to 1938, the gold-dollar exchange standard of Bretton Woods from 1946 to 1970, and the recent floating exchange rate regime from 1974 to 1989. Each observation represents the period average; in total there are 28 observations. It is quite clear that there is no definite association between inflation and per capita output growth. Similar growth rates can occur for a wide range of inflation experiences up to 10 per cent a year. The period averages across the seven countries tell the same story. The average annual inflation rate during the gold standard was 1 per cent and its output growth 1.5 per cent. In the inter-



war period the average inflation rate fell considerably more (to –1.1) than output growth (to 1.2). During Bretton Woods both inflation and output growth rose (to 3.6 and 4.2, respectively). Finally, in the floating years inflation rose (to 7.2) but output growth fell (to 2.2). To be sure, the four periods are not comparable because the economies were affected by different shocks and because the underlying economic structures were not constant. Yet, the claim that central bank reputation can affect economic growth does not emerge from the historical record of low-to-moderate levels of inflation rates.

Altogether different is the story when inflation rates rise to very high levels. Under those conditions money loses much of its property as medium of exchange, real tax revenues decline because inflation erodes their value from the time they are collected and the time they are spent, subsidies to firms increase, and finally there is social unrest. Furthermore, a great deal of physical and human resources shift from productive activities to beating-inflation strategies. There are several examples that high inflation rates hinder economic growth. Among the most recent ones it is worth citing Argentina and Bolivia in the 1980s. Inflation in Argentina rose from below 100 percent per year in 1980 to 1900 percent

in the second quarter of 1985, period during which real GDP fell by approximately 10 percent (*Machinea* and *Fanelli* 1988, p. 115 and p. 117). In Bolivia the inflation rate, during the same time span, rose to approximately 12000 percent in 1985; output fell even more than in Argentina (*Morales* 1988, p. 316). In both countries stabilization programs had to be implemented to stop the damages caused by high inflation rates. The recent strong economic gains made by Argentina, in particular the expansion in its market economy at the expense of government-owned enterprises, could have not been achieved with an unstable macroeconomic environment (*Cavallo* 1992).

A stable macroeconomic environment appears to have favored the implementation of structural reforms and prospects for growth in the former Czechoslovakia, Poland, and Hungary (IMF 1993, p. 58). Economic prospects look much grimmer in high-inflation-high-budget deficits countries such as Bulgaria, Romania, and in much of the former Soviet Union.

In sum, macroeconomic stability works like Frenkel's first stage rocket when inflation rates have reached hyperinflation levels; otherwise, trend economic performance is not negatively affected by inflation.

Economic growth is a positive function of physical and human capital accumulation. To facilitate such a process, governments ought not to penalize the activity of saving and investment. Feldstein (1992, p. 186) argues that practical considerations dictate that saving and investment should be promoted by tax incentives to compensate the bias in favor of consumption imbedded in many countries' tax code, in particular that of the United States. More generally, a pro-growth program would require a switch from income taxation to consumption taxation. There is virtually a consensus in the literature that human capital is an important determinant of economic growth. Raw, uneducated, labor in a developed society like the United States accounts for not more than 20 per cent of national income. The returns to education and training are relative large. Furthermore, countries where investment in education is high tend to have more equal income distributions than countries where there is an emphasis on physical capital accumulation (*Katz* 1992, p. 222). It follows that governments should not discourage investment in education through a high marginal tax rate on income.[8]

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[8] Distributional effects of tax policies could "freeze" governments into suboptimal equilibria. *Bertola* (1993) presents an interesting model where economic growth is a function of income distribution. The larger the share of income earned from reproducible assets, such as capital and knowledge, the higher economic

Many scholars advocate lower budget deficits to raise national saving. The prescription of raising tax rates to lower budget deficits and raise future economic growth is an unsettled issue. Much depends on whether the ratio of government expenditures to GDP is held constant and on the manner government spends revenues. Lower budget deficits (as a proportion of GDP) with higher tax revenues, higher government expenditures, and a higher proportion of government consumption cannot be constructed as a pro-growth strategy.

Finally, economic performance is better in economies that are more open to the rest of the world than in inward-oriented economies (World Bank 1987, p. 85). The link between openness and economic growth may not be fully known but it is a fact that the traded goods sector tends to have a higher productivity growth and is more competitive than the sheltered sector.

2. *Microeconomic implications*

There are three aspects of the new growth theory which bear directly on microeconomic policy: human capital development, technological development and equipment investment, and the link between growth and innovation. Human capital has a least three important implications for microeconomic policy. The first implication concerns the role of education and training of skilled workers, specialists, engineers, and scientists. Education is the main vehicle to raise the quality of human capital. As it is stated by *Lucas* (1988), a worker with human capital $h(t)$ is the productive equivalent of two workers with 0.5 $h(t)$ each, or a half-time worker with 2 $h(t)$. If education and training could increase human capital by, say, by 20%, then output would also increase by 20% without any increase in man-hours; that is, a higher quality of human capital translates into higher productivity.

The second implication is that human capital responds to new ideas and knowledge in the affected industry in the sense of geography (*Krugman,* 1991), as the example of Silicon Valley so vividly illustrates. The presence of a large group of employers specialized in innovation tends to attract a specialized pool of workers. High-human capital workers –

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growth for a given ratio of capital to output. The political economy implication is that pro-growth policies are easier to implement in countries where individuals derive earnings predominantly from the accumulation of physical and human capital than in countries where landowners and unskilled labor have a critical share of the income and political power.

with degrees in the sciences, computer science and marketing – would prefer that location to other because of the low search costs in finding employment and the higher opportunities for training and career advancement. In other words, industrial concentration tends to generate higher returns to scale.

The third implication of human capital concerns the incentives for innovation and imitation. Innovation and imitation, not only give impetus to new products and new production procedures, but also provide learning-by-doing techniques, which are another important way to raise human capital. One way to promote innovation is through incentive schemes such as bonuses, tournaments, and prize-awarding competition among employees.

Another aspect of the new growth theory is endogenous technological development and investment in equipment, especially machinery (*De Long* and *Summers,* 1992). Take the agricultural industry, for example. Endogenous technological development translates into investing resources in developing new methods of packaging, storage, demand forecasting, marketing and sale promotions; as well as in seed selection, irrigation, prevention of land erosion, and bio-technology. Even more important than technology development itself is the endogeneity of technological growth. This means designing institutions which would give firms incentives to adapt new technologies; without the demand for innovation, technological growth cannot be sustained. For example, privatizing government-owned enterprises would eliminate incentives for status-quo preservation and set in motion incentives to adopt new technologies.

The importance of equipment investment to the microeconomic policy is also obvious. Without equipment investment, technological development cannot start, let alone be sustainable.

The third contribution from new growth theory lies in the link between trade on the one hand and innovation and growth on the other (*Grossman* and *Helpman,* 1991a). From this prospective, it is clear that the growth of the agricultural industry, to continue with the earlier example, depends on trade of agricultural products, which in turn depends on the pace of innovation. Without sufficient innovation in the agricultural industry, trade in agricultural products would slow down to the point that even the domestic market for food would be occupied by other countries. That is, a low pace of innovation is associated with a decline in exports of agricultural products and a lower growth of the domestic agricultural industry. The message of the new growth theory is

clear: innovation is the engine for foreign trade and trade is an important source of productivity and economic growth in the agricultural industry.

IV. Conclusions

The main message of the new growth theory is that economic growth cannot be simply explained by capital accumulation. There are endogenous forces at work which account for one country to grow more rapidly than another. Technological improvements, new products, and human capital are the critical ingredients of this literature. Quantitatively, it is still too early to make a definitive list of the determinants of economic growth. The safe bet is to play all of the above cards.

Public policy has a big role to play in economic growth. Broadly speaking, the most pro-growth strategy is the one that at least does not hamper the accumulation of physical and human capital. While this sounds a sensible statement, national policies seem to be going in the opposite direction favoring consumption at the expense of saving and investment. Public policy can also foster growth by promoting openness.

Some lessons can be learned from the experiences of high-technology routes such as Silicon Valley in the United States. It is important to have a core industry that attracts people with high human capital. This pool of labor becomes a positive externality for other industries that desire to locate next to the core industry. While transportation costs may be the initial reason for choosing a given location, once the pool of skilled labor has been created other industries locate nearby because skilled workers are available. Skilled workers, on the other hand, would also want to locate in such an area because of job opportunities and the high probability to move to better paid jobs if additional skills are acquired. In essence, the area rewards new entrants as well as those who invest in additional human capital.

References

Arrow, Kenneth: "The economic Implication of Learning by Doing", Review of Economic Studies June, 1962, 29, 155 - 173. – *Azariades,* Costas and *Drazen,* Allan: "Treshold Externalities in Economic Development," Quarterly Journal of Economics 1990, 105, 501 - 526. – *Banks,* Arthur S.: "Cross National Time-Series Data Archive," Center for Social Analysis, State University of New York at Binghamton, September, 1979. – *Barro,* Robert: "A Cross-Country Study of Growth, Saving, and Government," NEBR Working Paper, #2855, 1989. – *Barro,* Robert:

"Government Spending in a Simple Model of Endogenous Growth," Journal of Political Economy 1990, 98, 103 - 125. – *Barro,* Robert: "Economic Growth in a Cross Section of Countries," Quarterly Journal of Economics May, 1991, 106, No. 2, 407 - 443. – *Barro,* Robert and *Becker,* Gary S.: "Fertility Choice in a Model of Economic Growth," Econometrica 1989, 57, 481 - 501. – *Baumol,* William J.: "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," American Economic Review 1986, 76, 1072 - 1085. – *Baumol,* William J., *Batey Blackman,* Sue Anne, and *Wolff,* Edward J.: Productivity and American Leadership: The Long View. Cambridge, MIT Press, 1989. – *Becker,* Gary S., *Murphy,* Kevin M., and *Tamura,* Robert: "Human, Fertility, and Economic Growth," Journal of Political Economy 1990, 98, 12 - 37. – *Bertola,* Giuseppe: "Factor Shares and Savings in Endogenous Growth," American Economic Review 1993, 83, 1184 - 1198. – *Bordo,* Michael D.: "The Bretton Woods International Monetary System: A Historical Overview", in A Retrospective on the Bretton Woods System, Edited by Bordo, Michael D. and Eichengreen, Barry. The University of Chicago Press for the National Bureau of Economic Research, 1993. – *Borland,* Jeff and *Yang,* Xiaokai: "Specialization and a New Approach to Economic Organization and Growth," American Economic Review, Papers and Proceedings 1992, 82, 386 - 391. – *Cavallo,* Domingo F.: "Economic Reorganization as a Prerequisite to Growth," in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *De Gregorio,* José: "The Effects of Inflation on Economic Growth: Lessons from Latin America," European Economic Review 1992, 36, 417 - 425. – *De Long,* Bradford and *Summers,* Lawrence: "Equipment Investment and Economic Growth," Quarterly Journal of Economics May, 1991, 96, No. 2, 445 - 502. – *De Long,* Bradford and *Summers,* Lawrence: "Macroeconomic Policy and Long-Run Growth," in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Denison,* Edward F.: Why Growth Rate Differ: Postwar Experience in Nine Western Countries, The Brookings Institute, Washington, D.C., 1967. – *Feldstein,* Martin: "Commentary", in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Frenkel,* Jacob A.: "Overview", in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Grossman,* Gene M. and *Helpman,* Elhanan: "Comparative Advantage and Long-Run Growth", Manuscript, Princeton University, 1988. – *Grossman,* Gene M. and *Helpman,* Elhanan: "Quality Ladders in the Theory of Growth," Manuscript, Princeton University, 1989. – *Grossman,* Gene M. and *Helpman,* Elhanan: "Quality Ladders and Product Cycles", Quarterly Journal of Economics May, 1991a, 106, No. 2, 557 - 586. – *Grossman,* Gene M. and *Helpman,* Elhanan: "Endogenous Product Cycle," The Economic Journal 1991b, 101, 1214 - 1229. – *Helpman,* Elhanan: "Growth, Technological Progress, and Trade," NEBR Working Paper #2594, May, 1988. – *Helpman,* Elhanan: "Endogenous Macroeconomic Growth Theory", NEBR Working Paper #3869, October, 1991. – International Monetary Fund: "World Economic Outlook", 1993. – *Jorgenson,* Dale: "Productivity and Postwar U.S. Economic Growth," Journal of Economic Perspectives 1988, 2, 23 - 41. – *Kaldor,* Nicholas, "Capital Accumulation and Economic Growth," in F. Lutz (ed.), The Theory of Capital, London: Macmillan, 1961. – *Kendrick,* John W.: Productivity Trends in the United States, Princeton University Press, 1961. – *Kendrick,* John W.: Postwar Productivity Trends in the United States, 1948 - 1969, NEBR and Columbia Uni-

versity Press, 1973. – *Kennedy,* Paul: The Rise and Fall of the Great Power, Random House, New York, 1987. – *Kennedy,* Paul: Preparing for the Twenty-first Century, Random House, New York, 1993. – *Kim,* Sunwoong and *Mohtadi,* Hamid: "Labor Specialization and Endogenous Growth," American Economic Review, Papers and Proceedings 1992, 82, 404 - 408. – *Koester,* Reinhard B. and *Kormendi,* Roger C.: "Taxation, Aggregate Activity and Economic Growth: Cross-Country Evidence on Some Supply Side Hypotheses," Economic Inquiry 1989, 367 - 386. – *Krueger,* Anne O.: Foreign Trade Regimes and Economic Development. Cambridge, MA: Ballinger, 1978. – *Krueger,* Anne O.: "Government Failures in Development," Journal of Economic Perspectives 1989, 4, 9 - 24. – *Krugman,* Paul: "Increasing Returns and Economic Geography," Journal of Political Economy 1991, 99, 483 - 499. – *Kuznets,* Paul W.: "An East Asian Model of Economic Development: Japan, Taiwan, and South Korea," Economic Development and Culture Change 1988, 36, 11 - 43. – *Lucas,* Robert E. Jr.: "On the Mechanics of Economic Development," Journal of Monetary Economics 1988, 22, 3 - 42. – *Machinea,* Jose Louis and *Faneli,* Jose Maria: "Stopping Hyperinflation: The Case of the Austral Plan in Argentina, 1985 - 87," in Inflation Stabilization edited by Michael Bruno, Guido Di Tella, Rudiger Dornbusch and Stanley Fischer, The MIT Press, 1988. – *Madison,* Angus: Phases in Capitalist Development, Oxford University Press, 1982. – *Madison,* Angus: "Growth and Slowdown in Advanced Capitalist Economies," Journal of Economic Literature June, 1987, 25, 649 - 698. – *Malthus,* Thomas Robert: An Essay on the Principle of Population, Mac Milland and Co., New York and London, 1985; first published in 1798. – *Mankiw,* N. Gregory: "Commentary", in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Mankiw,* N. Gregory, *Romer,* David and *Weil,* David N.: "A Contribution to the Emperics of Economic Growth," Quarterly Journal of Economics 1992, 407 - 438. – *Mathews,* Robert C. O., *Feinstein,* Charles H., and *Odling-Smee,* John C.: British Economic Growth 1856 - 1973, Clarendon Press, 1982. – *Meltzer,* Allan H.: "Commentary", in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Morales,* Juan-Antonio: "Inflation Stabilization in Bolivia," in Inflation Stabilization edited by Michael Bruno, Guido Di Tella, Rudiger Dornbusch and Stanley Fischer, The MIT Press, 1988. – *Murphy,* Kevin, *Shleifer,* Andrei and *Vishny,* Robert: "The Allocation of Talent: Implications for Growth" Quarterly Journal of Economics May, 1991, 106, No. 2, 503 - 531. – *Norsworthy,* J. R.: Growth Accounting and Productivity Measurement, Review of Income and Wealth 1984, 30, 309 - 329. – *Ohkawa,* Kazushi and *Rosovsky,* Henry: Japanese Economic Growth, Stanford University Press, 1973. – OECD: OECD Science and Technology Indicators N. 3: R&D, Production and Diffusion of Technology. Paris, 1989. – *Plosser,* Charles I.: "The Search for Growth," in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Prescott,* Edward C. and *Byod,* John H.: "Dynamic Coalitions, Growth, and the Firm." In Minnesota Studies of Macroeconomics 1, edited by Prescott, E. C. and Wallace, N., University of Minnesota Press, 1987. – *Rebelo,* Sergio, "Long-Run Policy Analysis and Long-Run Growth," Journal of Political Economy 1991, 500 - 521. – *Rivera-Batiz,* Luis A. and *Romer,* Paul: "Economic Integration and Endogenous Growth," Quarterly Journal of Economics May, 1991, 106, No. 2, 531 - 555. – *Romer,* Paul: "Increasing Returns and Long-Run Growth," Journal of Political Economy 1986, 94, No. 5, 1002 - 1037. – *Romer,* Paul: "Growth

Based on Increasing Returns Based on Specialization," American Economic Review May, 1987, 77, 56 - 62. – *Romer,* Paul: "Capital Accumulation in the Theory of Long Run Growth," in R. Barro (ed.), Modern Business Cycle Theory. Cambridge: Harvard University Press, 1989a. – *Romer,* Paul: "Human Capital and Growth: Theory and Evidence," NEBR Working Paper #3173, 1989b. – *Romer,* Paul: "Endogenous Technological Change," Journal of Political Economy 1990, 98, 71 - 102. – *Scott,* Maurice F.: A New View of Economic Growth. Oxford: Oxford University Press, 1989. – *Shigehara,* Kumiharu: "Causes of Declining Growth in Industrialized Countries," in Policies in Long-Run Economic Growth, A Symposium Sponsored by the Federal Reserve Bank of Kansas, 1992. – *Solow,* Robert M.: "A Contribution to the Theory of Economic Growth," Quarterly Journal of Economics February, 1956, 70, 65 - 94. – *Solow,* Robert M.: "Technical Change and the Aggregate Production Function," Review of Economics and Statistics 1957, 39, 312 - 320. – *Summers,* Robert, and *Heston,* Alan: "Improved International Comparisons of Real Product and its Composition: 1950 - 1980," Review of Income and Wealth June, 1984, 30, 207 - 262. – *Summers,* Robert, and *Heston,* Alan: "A New Set of International Comparisons of Real Product and Price Level: Estimates for 130 Countries, 1950 - 1985," Review of Income and Wealth March, 1988, 34, 1 - 26. – *Summers* and *Heston*: "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950 - 1988," Quarterly Journal of Economics May, 1991, 106, No. 2, 327 - 368. – World Bank: World Development Report 1987, World Bank and Oxford University Press, 1987. – *Young,* Alwyn: "Learning by doing and the Dynamic Effect of International Trade," Quarterly Journal of Economics May, 1991, 106, No. 2, 369 - 405.

Summary

New Growth Theory: A Survey from a Policy Perspective

The main message of the new growth theory is that economic growth cannot be simply explained by capital accumulation. Technological improvements, new products, and human capital are the endogenous forces that this literature emphasizes. Public policy plays a big role in economic growth. The most pro-growth strategy is the one that does not stifle the accumulation of physical and human capital. Yet, there are many governments which continue to favor consumption at the expense of saving and investment. Public policy can also foster growth by promoting openness.

Enrichment in human capital occurs through education, training, innovation and imitation. A good example of how these factors interact is Silicon Valley in the United States, where a core industry attracts people with high human capital. This pool of labor becomes a positive externality for other industries that desire to locate next to the core industry. The high-tech industrial park rewards new entrants as well as those who invest in additional human capital.

Zusammenfassung

Neue Wachstumstheorie: Überblick aus politischer Perspektive

Die Hauptbotschaft der neuen Wachstumstheorie besteht darin, daß Wachstum nicht einfach durch die Ansammlung von Kapital erklärt werden kann. Technische Verbesserungen, neue Erzeugnisse und Humankapital sind endogene Kräfte, die von diesem Artikel betont werden. Die Politik der Regierung spielt für das Wirtschaftswachstum eine große Rolle. Die am stärksten wachstumsorientierte Politik ist die, die die Ansammlung von greifbarem Kapital und Humankapital nicht behindert. Dennoch gibt es Regierungen, die dem Konsum Vorrang gewähren auf Kosten von Sparen und Investitionen. Die Politik der Regierung kann das Wachstum auch durch Offenheit fördern.

Bildung, Ausbildung, Innovation und Nachahmung erhöhen das Humankapital. Ein gutes Beispiel dafür, wie diese Faktoren zusammenwirken, ist das *Silicon Valley* in den Vereinigten Staaten von Amerika, wo eine Kernindustrie Menschen mit hohem Humankapitalfaktor anlockt. Diese Arbeitskraftreserven werden zu einem positiven externen Faktor für andere Industrien, die sich neben der Kernindustrie ansiedeln wollen. Der Hochtechnologie-Industriepark belohnt Neulinge genauso wie diejenigen, die in zusätzliches Humankapital investieren.

Résumé

Nouvelle théorie de la croissance – une étude dans une perspective politique

Le contenu principal de la nouvelle théorie de la croissance est que la croissance économique ne peut pas simplement s'expliquer par l'accumulation de capital. Les progrès technologiques, les nouveaux produits et le capital humain sont les facteurs-clefs endogènes de la croissance dans cette littérature. La politique publique joue un rôle primordial dans la croissance économique. La stratégie qui stimule le plus la croissance est celle qui ne restreint pas l'accumulation de capital physique et humain. Il y a encore beaucoup de gouvernements qui continuent à favoriser la consommation au dépens de l'épargne et de l'investissement. La politique publique peut aussi soutenir la croissance en promouvant l'ouverture.

Le capital humain s'enrichit à travers l'éducation, la formation, l'innovation et l'imitation. La Silicon Valley aux Etats-Unis, où un cœur industriel attire les individus avec un capital humain très élevé, est un bon exemple pour montrer l'interaction de ces facteurs. Ce pool de travail devient une externalité positive pour les autres industries qui chercheront à s'implanter près de ce cœur industriel. Le parc industriel de haute technologie récompense de nouveaux entrants aussi bien que ceux qui investissent en capital humain additionnel.