Marmara Üniversitesi
İngilizce İktisat Bölümü

Marmara University
Department of Economics

A Survey on Regional Growth and Regional Inequalities

Yasemin ÖZERKEK

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A Survey on Regional Growth and Regional Inequalities

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ABSTRACT

An issue having great importance in economics is income disparities across regions. There are a number of complex causes in explaining these regional income differences. Policy makers suggest employing regional policies to help backward regions to improve their economic performance. The objective of this paper is to provide a succinct review of the literature by exploring the concepts of regional economic growth and convergence, the determinants of regional income disparities, and the role of regional policy instruments in reducing these inequalities.

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*) Marmara University, Department of Economics.

1. Introduction

Substantial disparity in regional incomes, arising in many geographically large countries, has long been a key concern of the regional development literature. Rey (2001) emphasizes that an explosion of research on the question of regional economic convergence began with the reintroduction of the concept of region by Barro and Sala-i-Martin (1991). Thus, much of this research has shifted from studying the dynamics of international income disparities to the analysis of intranational dynamics (Rey, 2001).

Understanding the existence of poor regions initiated with the neoclassical exogenous growth model, developed by Solow and Swan in 1956. The theory states that per capita income differentials between regions are determined by their respective initial income levels. Among the recent studies, Hall and Jones (1996, 1998) underline the differences in governmental, geographical, cultural, and natural infrastructure as important sources of regional income differentials. They point out that the differences in capital accumulation, productivity, and thus output per worker are closely related with differences in social infrastructure, which encompasses the institutions and government policies that determine the economic environment. They treat social infrastructure as endogenous, determined historically by location and other factors (Hall and Jones, 1998).

The origins of regional income inequality analysis are traced back to the study of personal income inequality. Kuznets (1955)'s inverted-U hypothesis deals with the relationship between the level of development and personal income inequality. In early periods of development, the concentration of income generating wealth on certain groups of people was seen as a stimulus for the expansion of industrial activity. This served to benefit the other parts of the society as higher income in the following stages of development and therefore led personal income inequality to begin to slow and ultimately decline. Williamson (1965) applied the inverted-U pattern to the problem of uneven regional development,

focusing on the distribution of regional incomes instead of incomes of individuals. He argued that initial concentrations of income in certain geographic locations owing to the unequal natural resource endowments, attracted skilled labor migration from the peripheral regions and generated rapid income growth in the core regions. This resulted in widening income gaps in per-capita terms between the core and peripheral regions. As time passes however, subsequent slowing and eventual decline in regional income inequality are ensued through the diffusion of income generating factors (Rey, 2001).

The objective of this paper is to provide a succinct review of the literature by exploring the concepts of regional economic growth and convergence, the determinants of regional income disparities, and the role of regional policy instruments in reducing these inequalities. The remainder of the paper is organized as follows. Section 2 dwells on the concept of convergence identifying briefly the evolution of the different empirical approaches to the issue. Section 3 explains the causes of regional income disparities referring to the evidence from country examples. Section 4 delineates the concept of regional policy, and discusses its role in mitigating regional income disparities. Section 5 concludes the paper.

2. Convergence of Income across Countries (or Regions)

In the neoclassical framework, per capita income growth is inversely related with the initial per capita income level. Relatively poor countries will relatively have faster economic growth rates than other countries (or regions) provided that the economies have identical utility and production functions. The crucial assumption in the Solow model of diminishing marginal returns to capital gives rise the growth process within an economy to ultimately reach the steady state where per capita output, capital stock and consumption grow at the exogenously given rate of technological progress.

The hypothesis that poor economies tend to grow faster per capita than rich ones – without conditioning on any other characteristics of economies-is referred to as ***absolute (***or ***unconditional) convergence***. Absolute convergence is more likely to apply across relatively more homogeneous countries in terms of technology, preferences, institutions, and thus steady-state positions (Barro and Sala-i-Martin, 1995, Chp. 11).

Barro and Sala-i-Martin (1995) highlight that "a key property of the neoclassical growth model is its prediction of conditional convergence" (p.461). Such a concept applies "when the growth rate of an economy is positively related to the distance between this economy's level of income and its own steady state" (p.461). If the growth rate of an economy depends on its initial level of income but also depends on the steady-state level of income, the concept of conditional rather than absolute convergence is used (Barro and Sala-i-Martin, 1995). The core idea is that an economy grows faster the further it is from its own steady-state value. "The two concepts are identical only if a group of economies tend to converge to the same steady-state." (p.461)

In the literature of economic growth across countries and regions are existed two different concepts of convergence: β convergence and σ convergence.

i) β convergence applies "if a poor economy tends to grow faster than a rich one, so that the poor country tends to catch up to the rich one in terms of levels of per capita income or product." (p.462)

ii) σ **c**onvergence occurs "if the dispersion- measured, for instance, by the standard deviation of the logarithm of per capita income or product across a group of economies or regions- declines over time." (p.462)

Within the Solow framework, (unconditional) ***β*** convergence implies that the rate of savings, population growth, technological progress, depreciation, and initial technology A(0)

are identical across countries (regions) (Yudong and Weeks, 2000). The concept of unconditional convergence can be represented in the context of cross-sectional studies as follows:[1]

$$\frac{1}{T}(In(y_{iT} / y_{i0}) = a + \beta Iny_{i0} + u_i \quad (1)$$

where i=1,….N denotes the region index, and $y_{i,0}$ is the initial level of real per capita GDP, and $u_{i0,T}$ represents the effect of the error terms, u_{it}, between dates 0 and T. β <0 implies β convergence, in that growth depends negatively only on the initial level of per capita income.

a is additive in the effects of savings, population growth, initial technology A(0), and the exogenous rate of technological change g(.) (Yudong and Weeks, 2000). Mankiw et al. (1992) and Islam (1995) note that if $InA(0) = \omega + \varepsilon_i$, where ω is a constant and ε_i is a region (or country) specific shock term, then u_i will be given by $u_i = \in + \varepsilon_i$, where $\in$ is a random disturbance term. For any given region, ε_i is likely to be correlated with savings and population (Yudong and Weeks, 2000).

On the other hand, extending the unconditional model by controlling for differences in population growth rates and savings rate, the concept of conditional convergence arises:[2]

$$\frac{1}{T}(In(y_{iT} / y_{i0}) = a + \beta Iny_{i0} + \theta' x_i + u_i \quad (2)$$

[1] The exposition of the model is mainly based on Barro and Sala-i-Martin (1995).

[2] Islam (1995) argues that "while the finding of convergence has been generally thought of as evidence in support of Solow-Cass- Koopmans model, the absence of convergence has been regarded as supportive of endogenous growth theories. The controversy has given rise to the concept of "conditional convergence" meaning convergence after differences in the steady states across countries have been controlled for." (p.1127)

where x_i is a vector capturing the effects of "control and environmental variables" (Zhou, 2004, p.22) , and θ is the associated vector of coefficients. "However, parameter identification is solely based on cross-sectional information, it is still necessary to enforce homogeneity of both In A(0) and g. In this respect, a finding of conditional convergence implies that the economies converge to the same underlying steady-state path." (Yudong and Weeks, 2000, p.11).

> This concept of conditional convergence found its more explicit formulation in Barro and Sala-i-Martin (1992) and Mankiw et al. (1992). Both these papers emphasized the fact that the neoclassical growth model (either Solow's or its optimal saving version by Cass and Koopmans) did not imply that all countries would reach the same level of per capita income. Instead, what it implied is that countries would reach their respective steady states. Hence, in looking for convergence in a cross-country study, it is necessary to control for the differences in steady states of different countries. (Islam, 1995, p.1131)

Mankiw et al. (1992) argue that there is a strong evidence for β conditional convergence among many countries over the period 1960-1985, after saving, population growth, and human capital accumulation is controlled for. Islam (1995) and Caselli et al. (1996) discuss the soundness of this result stressing the problems with the cross-sectional approach, and the bias engendered by the correlation of omitted country specific effects and the steady state technology growth rate, g, resulting in the speed of convergence parameter to be biased downwards. Their argument is based on the assumption that the initial state of technology A(0) and g are homogenous across countries. If this homogeneity assumption does not hold, convergence estimates will be biased (Yudong and Weeks, 2000). While Barro and Sala-i-Martin (1991) and Mankiw et al. (1992) use cross-sectional studies of income convergence within the Solow growth framework, more recently, Islam (1995), Canova and Marcet (1995), Caselli et al. (1996), and Lee et al. (1997), among others have utilized panel

data approach to allow for unobservable country specific heterogeneity in growth regressions. Stating that

> The country specific aspect of the aggregate production function that is ignored in single cross-section regression is correlated with the included explanatory variables, and this creates omitted variable bias. The panel data framework makes it possible to correct this bias. (Islam, 1995, p. 1128)

Islam (1995) illustrates the usefulness of the panel data approach by taking the recent work by Mankiw et al. (1992) as the starting point, and examines how the results differ with this new approach. Having reformulated the regression equation used in the study of convergence into a dynamic panel data model with individual (country) effects and, used the panel data procedures to estimate it; the results are found to be significantly different from those obtained from single cross-section methodology. "First, the estimated rates of conditional convergence prove to be higher. Second, the estimated values of the elasticity of output with respect to capital are found to be much lower and more in conformity with its commonly accepted empirical values." (Islam, 1995, p.1128)

As Durlauf and Quah, (1998) state, "panel data studies proceed from the neoclassical MRW (Mankiw, Romer, and Weil) model." (p.49)

> While Barro and Sala-i-Martin (1991, 1992) defend a 2% annual rate of convergence from cross-section regressions, estimates from panel data analyses have been more varied.[3] Lee et al. (1997) conclude annual convergence rates are approximately 30% when one allows heterogeneity in all the parameters. Islam (1995) permits heterogeneity only in the intercept terms, and finds annual

[3] Barro and Sala-i-Martin (1991, 1992, and 1995) test the convergence predictions of neoclassical growth model by looking at the behavior of regions within countries. They investigate the existence of absolute and conditional convergence exploiting data for the U.S. states since 1880, the regions of eight European countries since 1950, and the prefectures of Japan since 1930. The results indicate that absolute β convergence holds for the regional economies that have roughly similar technology, preferences, and institutions. The speed of β convergence was found to be similar across data sets; the estimates of β are almost 2-3 % per year.

> convergence rates between 3.8% and 9.1%, depending on the subsample under study. (Durlauf and Quah, 1998, p.50)

Consequently, after the cross-sectional analyses of Barro (1991) and Mankiw et al. (1992) suggesting conditional convergence, Islam (1995) utilized panel estimates of the neoclassical model which provided level effects for individual countries through heterogeneous intercepts (i.e. the fixed effects). He argues that the cross-section estimates used by Barro (1991) and Mankiw et al. (1992) will be biased as these intercepts are correlated with the repressors. The third stage in the literature, developed by Lee et al. (1997), allows for heterogeneity in "level effects, growth effects, and speeds of convergence." (Lee et al., 1998, p.2)

> On a priori grounds, differential rates of technology growth across countries are clearly possible, while the neo-classical theory suggests that the speed of convergence to a country's equilibrium growth path will depend on the country's rate of population growth, it's rate of growth of technology and it's depreciation rate. (Lee et al., 1998, p.2)

Lee et al. (1998) point out that heterogeneity in growth rates leaves the concept of (conditional or unconditional) beta convergence insignificant in an economic sense:

> knowledge of the speed with which countries' outputs converge to their own equilibria provides no insights on the evolution over time of the cross-country variance of outputs or on issues involving cross-country welfare comparisons. Indeed, in the long run, the nature of the cross-country distribution of outputs will be determined by the nature of the cross country distribution of growth rates in technology; for example, a bi-modal distribution in technological growth rates will ultimately generate a bi-model distribution in outputs. (Lee et al., 1998, p.2)

3. Causes of Regional Inequalities

Per capita income levels and real growth rates may in fact diverge as in the case for many geographically large countries. Herz and Vogel (2003) suggest that endogenous growth

theory and economic geography provide theoretical arguments or scenarios for the divergence hypothesis.

The neo-classical assumption of diminishing marginal returns to capital is superseded by the assumption of increasing marginal returns of the New Growth Theory (Lucas 1988; Romer 1990). This new assumption implies that capital mobility no longer leads to convergence. "Nondecreasing marginal returns, agglomeration externalities, better infrastructures and a better human capital endowment in advanced economies make capital flowing from poor to rich countries" (Herz and Vogel, 2003, p.4), contrary to the convergence hypothesis. This lack of flows of capital from rich to poor regions is called the *Lucas paradox* (Lucas, 1990).[4] Furthermore, migration from capital poor economies to capital rich ones may stimulate divergence. If high-skilled labor constitutes the larger proportion of migration, "the loss of human capital in the poor regions (*brain drain*) more than compensates for the increase in the stock of physical capital per worker" (Herz and Vogel, 2003, p.4), thus reflecting the prediction of growth rate and income divergence of the endogenous growth theory. Additionally, economic geography models underline the role of the proximity and access to markets and of transportation costs in determining the locations for firms. Economies of scale and location advantages associated with easy access to markets, skilled labor and technological knowledge, together with the brain drain from the lagging regions, may lead to income divergence between regions (Herz and Vogel, 2003).

The "new economic geography" (Krugman 1991, 1999) and of "the new growth theory" suggest that in presence of increasing returns and local externalities, a greater

[4] Lucas (1990) poses the question: "Why doesn't capital flow from rich to poor countries?" "The widespread pressure of migration from poor to rich countries is undoubtedly indicative of a higher marginal productivity of labor in rich relative to poor countries (over and above the attractiveness of the rich welfare states to migrants from poor countries). However, ceteris paribus, a relatively lower marginal product of labor is usually associated with a relatively high marginal product of capital. In the wake of globalized capital markets, capital should flow from rich to poor countries so as to mitigate these differentials in marginal productivity of capital, and also of labor, assuming constant-returns-to-scale and identical technologies (via globalization). This is the essence of the Lucas paradox." (Razin and Sadka, 2004, p.3)

integration may lead to further regional divergence. "The dismantling of trade barriers (including the adoption of a common currency) reduces transaction costs between regions and gives rise to the spatial agglomeration of productive activities in the richest and most densely populated areas" (Basile et al., 2001, p.1), where firms have access to desired inputs, skilled labor, technological knowledge, and high quality infrastructures. Consequently, due to agglomeration forces the economic activities takes place in the core regions (Basile et al., 2001).

Basile et al. (2003) note that endogenous growth models and new economic geography, however, do not imply that a core-periphery structure of economic activities is bad from an efficiency point of view. On the contrary, because the cost of innovation in the richer region goes down as the agglomeration of economic activities increases, spatial concentration affects the rate of innovation and thus on the long term growth of the overall economy.

An alternative approach in explaining the income disparities belongs to Hall and Jones (1996). They list the sources of income variation across countries (or regions). According to their analysis, "a high productivity country i) has institutions that favor production over diversion, ii) is open to international trade, iii) has at least some private ownership, iv) speaks an international language, and iv) is located in a temperate latitude far from the equator. A favorable infrastructure helps a country both by stimulating the accumulation of human and physical capital, and by raising its total factor productivity." (p.1)

Historians and economists have long noted the crucial role of geographical factors in economic development.[5] The thoughts of earlier economists and historians, summarized by

[5] Krugman (1991) states that "there is long if somewhat thin tradition in location theory…Indeed, several schools of thought may be identified. Best known, perhaps, is the German Schools, originating in the work of von Thünen (1823) but led in the twentieth century by Weber (1909), Christaller (1933), and Lösch (1940). Inspired by this German School, but less preoccupied with the geometry of location, was thw American school of regional science, including Hoover (1948) and especially Isard (1956). Yet another tradition, drawing on Marshall's description of agglomeration due to external economies, stresses the role of externalities, in

Gallup et al. (1999), point to four major areas in which geography plays a central role in economic productivity: transport costs, human health, agricultural productivity, and proximity and ownership of natural resources.

Hall and Jones (1998), Gallup et al. (1999), Masters and McMillan (2000) and Sachs (2000), all draw attention to the relationship between geographical factors and cross-country levels of per capita income. Likewise, geographical factors are considered to be crucial in explaining regional income differences. The regions that tend to be thriving are those that are advantageous in terms of climate and topographical characteristics as well as in proximity to large markets. Climate is particularly important in that it is closely related with both human health and agricultural productivity**.** Furthermore, coastal economies have an advantage over landlocked economies in terms of low transport costs and proximity to markets. Among the most important reasons why some regions remain behind others are the lack of diffusion of technology into these regions, and a massive brain drain from them.[6]

There are also numerous and complex country and region- specific causes in explaining regional income disparities. China, for example, having an impressive nationwide economic growth, has received considerable interest due to the obvious income disparity between coastal cities and interior areas and therefore uneven growth and development across its regions. Among the generally accepted reasons for the poor performance of interior regions are poor economic basis, shortage of capital, low quality of human resources, closed culture, preferential government policies, lack of infrastructure facilities, and unfavorable geographical location (Fu, 2003; Zhou, 2004). "Two additional impediments to income convergence are the household registration system, which makes the movement of the rural

producing divergent regional development; the most influential writings in this tradition are those of Myrdal (1957), Hirschman (1958), and Perroux (1950), and this tradition has been carried on more recently by David (1984) and Arthur (1989)." (p.1-2)

[6] Sachs (2000) gives the same reasons for the underdevelopment of tropical regions.

poor to prosperous areas illegal, and the monopoly state bank system that, because of its bureaucratic nature, disburses most of its funds to its large traditional customers, few of whom are located in the western provinces." (Démurger et al., 2002, p.1)[7] Démurger et al. (2002) specify the underlying causes of regional divergence in China in two groups:

i) *Preferential policies*: basically deregulation policies that have allowed coastal Chinese provinces to marketize and to integrate them to international economy.

ii) *Geographic reasons*: coastal provinces benefit from arable land, better conditions, etc.

Dolinskaya (2002) analyzes the dynamic pattern of comparative regional development during transition in Russia, using the transition matrix methodology. The study reveals that, on the contrary to pretransition times, regional income mobility over the period from 1991 to 1997 tended toward a highly uneven long-term distribution with the majority of regions at relatively low income levels and a minority of higher income regions. Dolinskaya (2002) points out that the major reason for the rise in interregional income inequality following decentralization and liberalization of foreign trade is *industrial specialization* in prereform Russia.[8] The other cited reason for the regional divergence in Russia is the failure of fiscal decentralization in that it did not provide adequate incentives for advancement of market-oriented reforms along with the independence given to regions in designing their policies (Dolinskaya, 2002).

[7] The household registration system in China is called *hukuo*.

[8] "In transition, resource extracting regions can benefit from exporting primary products and increasing their exposure to the world market, while resource-processing regions may collapse due to lack of competitiveness of their products and lack of domestic demand. Hence, the industrial specification effect can result in a polarization of regions into a richer extracting cluster and a poorer processing cluster." (Dolinskaya, 2002, p.19)

4. The Role of Regional Policy in Mitigating Regional Inequalities

In the face regional income differences, policy makers suggest employing regional policies to help lagging regions to improve their economic performance. Taylor (2002) defines regional policy as follows:

> Regional policy is…about inducing *indigenous* economic development by encouraging new firm formation and the growth of small firms. It is about stimulating the expansion of productive capacity from within low income / high unemployment regions rather than relying entirely on inward investment to solve the problem. It is also about getting local people and local organizations integrally involved in the process of economic development by encouraging partnerships and by providing appropriate institutional mechanisms for creating a stronger regional economy. (p.2)

According to the convergence hypothesis of the neoclassical theory, regional income disparities result in a decline in the long- run. Migration of unskilled labor from poor to rich regions brings about an increase in wages in the home country, and a decline in regions of destination. "Furthermore, increased demand for imports, the diffusion of technology, and diseconomies of location associated with over-congestion in rapidly growing centers might give rise to spread effects which peripheral regions might benefit from. That is to say, regions would then tend to converge over time." (Bergström, 1998, p.4) Unanticipated shocks may cause the regional income divergence but the convergence process will occur, thus living no room for government intervention via regional policy. Government intervention could even be destructive if firms are directed to locate in areas they would not typically choose. Moreover, by providing subsidized housing, the government may discourage the unemployed from migrating to other regions to find jobs. As a result, this view suggests that regional policy results in a less efficient economy.

Taylor (2002) stresses that whether regional income disparities will automatically decline over the long-run and the speed at which such convergence occurs is subject to much

debate and empirical testing. He points out that there is in fact evidence of regional income convergence within many developed economies, albeit with a slow pace of convergence (See Table 1).

Table 1 Convergence in Income per capita in Selected Countries

Country	Number of regions	Time period	Rate of β-convergence (conditional) % per annum	Regional income inequality (σ-convergence)			
				1940	1950	1970	1990
USA	48	1880-1990	1.7	0.35	0.24	0.17	0.17
Japan	47	1955-90	1.9	0.63	0.29	0.23	0.15
Europe	90	1950-90	1.5	-	-	-	-
Germany	11	1950-90	1.4	-	0.31	0.20	0.19
Sweden	24	1911-93	2.4	0.26	0.15	0.10	0.07
UK	11	1950-90	3.0	-	0.17	0.10	0.12
France	21	1950-90	1.6	-	0.21	0.17	0.14
Italy	20	1950-90	1.0	-	0.43	0.33	0.27
Spain	17	1955-87	2.3	-	0.34	0.27	0.22
Canada	10	1961-91	2.4	-	-	-	-

Source: Taylor, 2002, p.24.

"An underlying assumption of regional policy is that substantial disparities in economic performance between regions can have undesirable consequences and that there is a strong case for government intervention. Governments therefore have a responsibility to speed up income growth in low-income regions." (Taylor, 2002, p.4) The proponents of regional policy argue that "regional income convergence is far from inevitable and that there are powerful divergent processes at work that drive a wedge between high and low-income areas, causing long-term persistence in regional income disparities." (p.4) Taylor discusses that there is considerable evidence to support this assertion, particularly in the developing economies (e.g. in India and China).

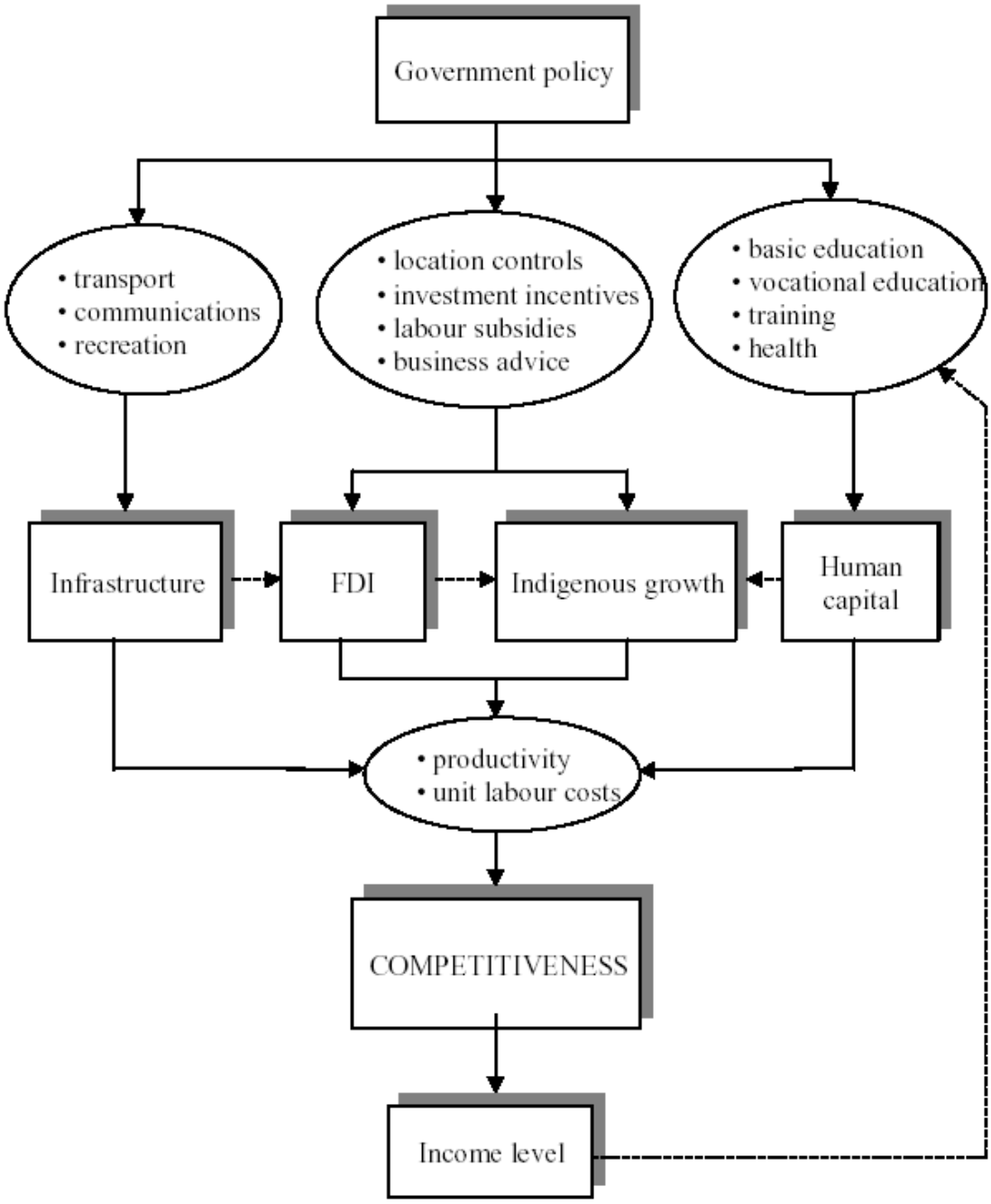
Taylor (2002) specifies three approaches to reducing regional income inequalities, highlighting the role of the interventionist approach:

> (i) a *market-based* approach, which focuses on correcting failures in the labor market due to wage inflexibility, immobility of labor and capital constraints; (ii) an *interventionist* approach based on government attempts to stimulate investment in lagging regions; (iii) *fiscal transfers* based on automatic stabilizers (such as unemployment benefit), block grants and discretionary spending by the government. (p.6)

According to the interventionist approach, regional policy should aim at improving competitiveness in the backward regions through encouraging investment in these regions. Figure 1 illustrates three types of investment. The first type involves investment in physical capital in backward regions to stimulate indigenous growth. The potential policies include location controls and investment incentives. The second type is the investment in public infrastructure, which aims at removing the characteristics that impede potential investors such as poor transportation and general infrastructure. Finally, raising educational attainment and skill level is the key to a region's competitiveness and thus growth rates (Taylor, 2002).

Bergström (1998) suggests that by giving subsidies to firms in the backward regions the government can have an effect on regional growth rates in two ways. i) via an increase of investments and/or an increase of labor, and ii) via an increase of productivity which might occur if the subsidies, for instance, serve the firms to improve their technological development and/or help them to better utilize economies of scale.

Bergström (1998) also argues that regional policies may turn out to be ineffective because i) resources might be allocated sub-optimally as bureaucrats and political makers do not have adequate information to allocate resources efficiently, ii) firms that have economic problems are more likely to be successful in the political decision process, and therefore regulations and different types of subsidy may give rise to slow down the process of structural adjustment, and iii) potential recipients of subsidies will have an incentive to invest in unproductive rent-seeking activities instead of more productive activities like R&D (p.5).



Source: Taylor, 2002, p.30.

5. Conclusion

An issue having great importance in economics is income disparities across regions. A wide range of reasons has been forwarded to explain the divergence of regional income. While endogenous growth theory points out increasing returns to scale, economic geography models highlight the role of the location advantages. Economies of scale, location advantages, skilled labor and technological knowledge, together with the brain drain from the backward regions, may lead to income divergence between regions. As is mentioned before, there are also a number of complex country and region- specific causes in explaining regional income disparities (e.g. in China and Russia).

The proponents of mainstream neoclassical economics argue that the regional disparities will automatically decline in the long-run. On the other hand, in the face of regional income differences, policy makers suggest employing regional policies to help backward regions to improve their economic performance. On this respect, these policies mainly aim at leading an increase of productive investments in both physical and human capital, stimulating entrepreneurship, and increasing the productivity in the targeted regions. However, it is worth noting that it is important to decide policies being implemented carefully in case they may give rise to ineffective outcomes due the reasons outlined by Bergström (1998).

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