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15 June 2022

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by

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Batabyal acknowledges financial support from the Gosnell endowment at RIT. The usual disclaimer applies.

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Abstract

We study the properties of economic growth in a region that is driven by the activities of the so-called creative class. On the consumption side of our regional economy, we focus on an infinitely lived creative class household and on the production side of this same economy, we concentrate on a final good that is produced using creative and physical capital. In this setting, we first define and then characterize a competitive equilibrium for our regional economy. Second, we show that this competitive equilibrium is Pareto optimal. Third, we demonstrate that sustained growth in this regional economy is impossible when the value of a key parameter of the production function is less than or equal to unity. Fourth, we specify the conditions in our model that need to hold for there to be sustained economic growth. Fifth, we study what happens to the share of physical capital in our region's total income. Finally, we analyze what happens to the asymptotic growth rate of physical capital and consumption when a regional authority taxes the returns from physical capital.

Keywords: Capital Tax, Creative Class, Economic Growth, Pareto Optimality, Sustained Growth

JEL Codes: R11, O40, H22

1. Introduction

1.1. Preliminaries

In a number of prominent books and papers, the urbanist Richard Florida (2002, 2003, 2005, 2008, 2014) has contended that cities and regions that want to prosper in this era of globalization need to do all they can to draw in and retain members of the so-called *creative class*.[4] Why? This needs to be done because, *inter alia*, the entrepreneurial nature of the members of the creative class ensures that they are the primary drivers of city and regional economic growth and development.

If one accepts Florida's assertion that cities and regions seeking to thrive economically need to attract members of the creative class then two questions follow naturally. First, how are cities and regions to do what Florida would like them to do? Second, once a sufficient number of creative class members have been attracted and retained in a city or region, what impact will the creative class have on city or regional economic growth?

The first question has now been addressed in the literature in a variety of contributions such as Buettner and Janeba (2016), Batabyal *et al*. (2019), Batabyal and Beladi (2021), Batabyal and Nijkamp (2022), and Batabyal and Yoo (2022). The consensus here seems to be that cities and regions can use local public goods (cultural amenities, quality schools, public transit) and tax policy to attract members of the creative class. Much less attention has been devoted to analyzing the preceding paragraph's second question. As such, our objective in this chapter is to theoretically study the properties of regional economic growth when this growth is driven primarily by the activities of the creative class. However, before we do this, we first briefly review the literature that has addressed questions that are related to our objective in this chapter.

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[4] According to Florida (2002, p. 68), the *creative class* "consists of people who add economic value through their creativity."

1.2. Literature review

McGranahan and Wojan (2007) study the extent to which Richard Florida's contention about the salience of the creative class for regional economic growth and development is borne out by the data. Their analysis finds some support for Florida's contention in both rural and urban counties in the United States. Nathan (2007, p. 433) studies whether Florida's assertion about the central role played by the creative class in promoting city and regional development holds for cities in the UK. He finds weak support for Florida's contention and concludes that "the creative class model is a poor predictor of UK city performance."

Concentrating on 40 midsized Canadian urban areas, Sands and Reese (2008) find partial support for the Floridian notion that creating a welcoming environment for the creative class can yield dividends as far as the promotion of economic health and growth is concerned. Boschma and Fritsch (2009) analyze a dataset covering 500 regions in seven European nations. Their empirical analysis finds some evidence of a positive relationship between creative class occupations and employment growth and entrepreneurship in many of the regions being studied.

Ought policymakers to use "creative strategies" to promote urban economic development? Hoyman and Faricy (2009) shed light on this question by using data for 276 metropolitan statistical areas to test Florida's contention that the creative class promotes economic growth. Their empirical analysis finds no connection between the creative class and urban economic growth and therefore these researchers warn policymakers that "creative strategies" are not the panacea that some think they are. This finding is contradicted by the work of McGranahan *et al*. (2011). These researchers focus on rural counties in the United States and credibly point out that the share of the workforce employed in the creative class is associated with the growth of both new establishments and employment.

Currid-Halkett and Stolarick (2013) look at how the creative class affects regional unemployment in the aftermath of the recent financial crisis. They find that every subgroup within the creative class is associated with lower regional unemployment even though the specific impact on unemployment varies across the different subgroups under study. Batabyal and Yoo (2018a) examine the circumstances in which taxes and subsidies on the research and development (R&D) undertaken by the creative class---who are referred to as existing and candidate entrepreneurs---positively influences a region's economic growth. A key point emphasized in this paper is that the R&D conducted by the competing candidate entrepreneurs leads to negative externalities. Batabyal and Yoo (2018b) study the same setting as in Batabyal and Yoo (2018a) but now they assume that the R&D conducted by the candidate entrepreneurs does not lead to negative externalities. The aim in this paper is to examine how this altered assumption affects the growth prospects of the region under study.

The numerous studies that we have discussed in this section thus far have certainly advanced our understanding of economic growth in what we might call creative regions.[5] Even so, to the best of our knowledge, there are *no* studies in the extant literature that have studied the conditions under which sustained economic growth might occur in a creative region and how physical capital taxation affects the growth prospects of this same creative region. Given this lacuna in the literature, the objective of this chapter is to analyze the attributes of sustained economic growth in a region that is driven by the activities of the creative class.

The remainder of this chapter is arranged as follows: Section 2 delineates the theoretical framework that is adapted from the well-known AK model described in Acemoglu (2009, pp. 387-407). In this framework, on the consumption side of our regional economy, we focus on an

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By "creative region," we mean a region in which the creative class is a dominant part of the overall workforce.

infinitely lived creative class household and on the production side of this same economy, we concentrate on a final good that is produced using creative and physical capital. Section 3 first defines and then characterize a competitive equilibrium for our regional economy. Section 4 shows that this competitive equilibrium is Pareto optimal. Section 5 demonstrates that sustained growth in our regional economy is impossible when the value of a key parameter of the production function is either less than or equal to unity. Section 6 specifies the conditions in our model that need to hold for sustained economic growth to be possible. Section 7 examines what happens to the share of physical capital in our region's total income. Section 8 analyzes what happens to the asymptotic growth rate of physical capital and consumption when a regional authority taxes the returns from physical capital. Section 9 concludes and then suggests two ways in which the research described in this chapter might be extended.

2. The Theoretical Framework

Consider an infinite-horizon, continuous-time, stylized region that is creative in the sense of Richard Florida. Concretely, this means that members of the creative class are a *dominant* part of the overall workforce in this region. As such, in what follows, we shall *not* consider the entire labor force of the region under study. Instead, we shall concentrate specifically on the creative class and its economic growth generating activities. In this regard, note that every creative class member possesses *creative capital* which is defined to be the "intrinsically human ability to create new ideas, new technologies, new business models, new cultural forms, and whole new industries that really [matter]" (Florida, 2005, p. 32). This is what distinguishes a creative class member from a generic worker in our region. Let us denote each creative class member's creative capital at time t by $R(t)$.

The representative creative class household in our region is assumed to display constant relative risk aversion (CRRA) and its CRRA utility function[6] is given by

$$\int_0^{\infty} e^{-(\rho-m)t}\left\{\frac{c(t)^{1-\theta}}{1-\theta}\right\}dt, \tag{1}$$

where ρ is the constant time discount rate, m is the constant exponential growth rate of the creative class population, $c(t)$ denotes consumption of the final good that is produced in this region per each creative class member's creative capital, i.e., $c(t) = C(t)/R(t)$ and θ is the coefficient of relative risk aversion. The available creative capital is supplied inelastically in our model.

The final good in our stylized region at any time t or $Q(t)$---which the reader may want to think of as a knowledge good such as a camera, a smartphone, or a laptop computer---is produced using a constant elasticity of substitution (CES) production function[7] which can be written in its so-called *extensive* form as

$$Q(t) = A\left\{R(t)^{\frac{\sigma-1}{\sigma}} + K(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}, \tag{2}$$

where A is a positive technology coefficient, $R(t)$ denotes creative capital, $K(t)$ denotes physical capital, and $\sigma \in [0, \infty]$ is the constant elasticity of substitution. We assume that physical capital depreciates exponentially over time at rate δ. Now, using equations (11) and (12) in Klump *et al.*

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See Acemoglu (2009, pp. 308-309) for a textbook exposition of the CRRA utility function.

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See Acemoglu (2009, pp. 54-55) for a textbook discussion of the CES production function.

(2012), we can write the extensive CES production function in equation (2) in its so-called *intensive* form. Doing this, we get

$$q(t) = A\left\{1 + k(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}, \tag{3}$$

where $q(t) = Q(t)/R(t)$ is output of the final good per creative class member's creative capital and $k(t) = K(t)/R(t)$ is physical capital per creative class member's creative capital.

The flow budget constraint faced by the representative creative class household is given by the differential equation

$$\frac{da(t)}{dt} = \dot{a}(t) = \{r(t) - m\}a(t) + w(t) - c(t), \tag{4}$$

where $a(t)$ denotes assets per creative class member's creative capital, $r(t)$ is the interest rate, $w(t)$ is the wage or return per creative class member's creative capital, and m is the growth rate of the creative class population. Finally, adapting equation (11.3) in Acemoglu (2009, p. 388) to our problem, the so-called "no Ponzi game" constraint[8] is given by the inequality

$$lim_{t\to\infty}\left[a(t)e^{-\int_0^t\{r(s)-m\}ds}\right] \geq 0. \tag{5}$$

The purpose of this "no Ponzi game" constraint is to ensure that a proper *lifetime* budget constraint influences the representative creative class household's consumption choice over time.

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See Acemoglu (2009, pp. 291-292) for a textbook discussion of the "no Ponzi game" constraint.

With this description of the theoretical framework in place, our next task is to first define and then characterize a competitive equilibrium for our stylized, creative region. While undertaking this and subsequent tasks, we shall adapt some of the results in Peters and Simsek (2009, pp. 171-177) to our analysis of economic growth in a creative region.

3. The Competitive Equilibrium

A competitive equilibrium in the economy of our creative region consists of time paths or trajectories of allocations and prices $\{a(t), c(t), k(t), r(t), w(t)\}_{t=0}^{\infty}$ such that our representative creative class household solves

$$max_{\{a(t),c(t)\}\forall t} \int_0^{\infty} e^{-(\rho-m)t} \left\{\frac{c(t)^{1-\theta}-1}{1-\theta}\right\} dt, \tag{6}$$

subject to the flow budget constraint in equation (4) and the no Ponzi game constraint in (5).

In addition, the competitive firms operated by the creative class maximize their profits. This means that the two factors of production---creative and physical capital---are paid the value of their marginal products and, as a result, we have two first-order necessary conditions for an optimum. The optimality condition for physical capital can be written as

$$r(t) = g'\{k(t)\} - \delta, \tag{7}$$

where $g\{k(t)\} = A\left\{1 + k(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}$. Similarly, after some algebra, the optimality condition for creative capital can be expressed as

$$w(t) = g\{k(t)\} - k(t)g'\{k(t)\}. \tag{8}$$

In addition to the above two conditions, we also need the asset $A(t)$ and the final good $Q(t)$ markets in our creative region to clear.

Let us now proceed to describe the competitive equilibrium in four parts. First, after some algebra, the two input prices given in equations (7) and (8) can be rewritten as

$$r(t) = Ak(t)^{\frac{-1}{\sigma}}\left[\left\{1 + k(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}\right]^{\frac{1}{\sigma}} - \delta \tag{9}$$

and

$$w(t) = A\left[\left\{1 + k(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}\right]^{\frac{1}{\sigma}}. \tag{10}$$

Second, let us concentrate on the representative creative class household's maximization---see equation (6)---problem. The current value Hamiltonian for this problem is

$$\mathbb{H}(t, a, c, \zeta) = \frac{c(t)^{1-\theta}-1}{1-\theta} + \zeta[\{r(t) - m\}a + w(t) - c], \tag{11}$$

where ζ is the costate variable on the asset/state constraint given in equation (4). The first-order necessary conditions for a maximum are

$$\frac{\partial \mathbb{H}}{\partial c} = 0 \Rightarrow \frac{1}{c^{\theta}} = \zeta \tag{12}$$

and

$$\frac{\partial \mathbb{H}}{\partial a} = (\rho - m)\zeta - \dot{\zeta} \Rightarrow \frac{\dot{\zeta}}{\zeta} = -\{r(t) - \rho\}. \tag{13}$$

Combining equations (12) and (13), we obtain the so-called Euler equation.[9] That equation is

$$\frac{\dot{c}(t)}{c(t)} = \frac{1}{\theta}\{r(t) - \rho\}. \tag{14}$$

Using equation (9), we can substitute for $r(t)$ in the above Euler equation. Doing this, we get

$$\frac{\dot{c}(t)}{c(t)} = \frac{1}{\theta}\left[Ak(t)^{\frac{-1}{\sigma}}\left[\left\{1 + k(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}\right]^{\frac{1}{\sigma}} - \delta - \rho\right]. \tag{15}$$

Third, we need to work with the so-called transversality condition. Modifying equation (11.5) in Acemoglu (2009, p. 388) to our problem, the transversality condition of interest is

$$lim_{t\to\infty} e^{-\{(\rho - m)t\}}\zeta(t)a(t) = 0. \tag{16}$$

To further simplify this transversality condition, let us solve the differential equation given on the right-hand-side RHS of equation (13) and then substitute for $r(t)$ using equation (9). This gives us a rewritten transversality condition and that condition can be expressed as

$$lim_{t\to\infty} e^{-\int_0^t [g'\{k(s)\} - \delta - m]ds} k(t) = 0. \tag{17}$$

Finally, from Acemoglu (2009, p. 389), we infer that the asset market clearing condition is $a(t) = k(t)$. Using this last condition along with the two input prices given in equations (9) and

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See Acemoglu (2009, pp. 202-205) for a textbook exposition of Euler equations.

(10) in the representative creative class household's flow budget constraint, we obtain what might be called a "resource constraint" for $k(t)$. That equation is

$$\dot{k}(t) = g\{k(t)\} - (\delta + m)k(t) - c(t). \tag{18}$$

Now, the differential equations given by (15) and (18), the transversality condition in (17), and the initial condition $k(0)$ together describe exclusively the competitive equilibrium allocation $\{c(t), k(t)\}_{t=0}^{\infty}$ that we seek. Let us now demonstrate that this competitive equilibrium is Pareto optimal.

4. Pareto Optimality

To demonstrate the Pareto optimality of the competitive equilibrium described in section 3, we have to analyze the so-called social planner's optimization problem for our stylized, creative region. This planner solves

$$max_{\{c(t),k(t)\}\forall t} \int_0^{\infty} e^{-(\rho-m)t} \left\{\frac{c(t)^{1-\theta}-1}{1-\theta}\right\} dt \tag{19}$$

subject to the "resource constraint" in equation (18) and a non-negativity condition on the physical capital per creative class member's creative capital or $k(t) \geq 0$.

The current value Hamiltonian for the above maximization problem is

$$\mathbb{H}(t, c, k, \zeta) = \frac{c(t)^{1-\theta}-1}{1-\theta} + \zeta\{g(k) - (\delta + m)k - c\}. \tag{20}$$

Using standard techniques, the first-order necessary conditions for an optimum, as in section 3, give us the Euler equation in (15).

We know from Acemoglu (2009, pp. 235-239) that the maximized Hamiltonian function is strictly concave. Therefore, the time path of the two control variables that satisfy the Euler equation in (15), the resource constraint in (18), and the transversality condition in (17) is the unique solution to the maximization problem in (19). This means that the "per creative class member's creative capital" variables $\{c(t), k(t)\}_{t=0}^{\infty}$ chosen by the social planner are the *same* as the competitive equilibrium values delineated in the last paragraph of section 3. This last result tells us that the competitive equilibrium discussed in section 3 *is* Pareto optimal.

Our next task is to analyze the relationship between the *magnitude* of the constant elasticity of substitution parameter σ and sustained economic growth in our creative region.

5. Sustained Economic Growth

Having shown the existence of a competitive equilibrium that is Pareto optimal, we now want to understand when there will be sustained economic growth in our creative region. To answer this question, we shall focus on the magnitude of a key parameter in our model. That parameter is the constant elasticity of substitution or σ in equation (2).

Let us first consider the case in which $\sigma = 1$. In this case, from the discussion in Acemoglu (2009, p. 54), it follows that the CES production function in equation (2) becomes the Cobb-Douglas production function that can be expressed as $g(k) = Ak^{1/2}$. This Cobb-Douglas production function satisfies the so-called Inada conditions stated in assumption 2 in Acemoglu (2009, p. 33). In addition, our model now closely resembles the neoclassical economic growth model discussed in Acemoglu (2009, pp. 287-326). The preceding two points allow us to conclude that the "per creative class member's creative capital" variables $\{c(t), k(t)\}_{t=0}^{\infty}$ converge to a steady state denoted by (c^{SS}, k^{SS}) and therefore there is *no* sustained economic growth in our creative region.

Next, let us consider the case in which $\sigma < 1$. In this case, using equation (9) to describe the marginal product of physical capital, we infer that the $g'\{k(t)\}$ function is a decreasing function and therefore we can write

$$lim_{k(t)\to 0} g'\{k(t)\} = A \text{ and } lim_{k(t)\to\infty} g'\{k(t)\} = 0. \qquad (21)$$

Now, in contrast to the $\sigma = 1$ case, assumption 2 in Acemoglu (2009, p. 33) is violated when $g(t) \to 0$. As such, to make further progress about the possibility of sustained economic growth, it will be useful to consider two sub-cases.

In the first sub-case, we have $\delta + \rho > A$. This inequality tells us that irrespective of the level of the $k(t)$ ratio, we obtain $g'\{k(t)\} - \delta - m < 0$. Therefore, the Euler equation now tells us that $\dot{c}(t)/c(t) < 0, \forall t$, and hence $lim_{t\to\infty} c(t) = 0$. From equation (18), we deduce that $lim_{t\to\infty} k(t) = 0$ because if this were not the case then the ratio $k(t)$ would keep growing and eventually violate the transversality condition in equation (17). Hence, when $\delta + \rho > A$, the $c(t)$ and the $k(t)$ ratios both asymptotically converge to zero. This means that *no* sustained economic growth in our creative region is possible.

In the second sub-case, we suppose that $\delta + \rho \leq A$ holds. In this instance, a steady state equilibrium (c^{SS}, k^{SS}) exists and in this equilibrium, the conditions

$$c^{SS} = g(k^{SS}) - (\delta + m)k^{SS} \text{and } k^{SS} = (g')^{-1}(\delta + \rho) \qquad (22)$$

hold. Now, because of the similarity between our model and the neoclassical growth model discussed in Acemoglu (2009, pp. 287-326), given the initial condition $k(0)$, there exists a unique trajectory or time path for the variables $\{c(t), k(t)\}_{t=0}^{\infty}$ that converges to the steady state (c^{SS}, k^{SS}). Specifically, the physical capital to each creative class member's creative capital ratio is *constant* in the limit and therefore sustained economic growth is *impossible*. Another way to comprehend why sustained economic growth in this second sub-case is impossible is to recognize that as $k(t) \to \infty$, the pertinent Inada condition---see Acemoglu (2009, p. 33) is satisfied. This means that as the $k(t)$ ratio rises, the economy of our creative region encounters diminishing returns and thus economic growth cannot be sustained by accumulating physical capital only. Summing up the discussion in this section, if the constant elasticity of substitution $\sigma \leq 1$ then sustained economic growth in our creative region is *impossible*.

Having discussed when sustained economic growth in our creative region is not possible, our next task is to delineate conditions, which, when they hold, make sustained economic growth possible.

6. Sustained Economic Growth Once Again

Since we have ruled out the possibility of there being sustained economic growth when the constant elasticity of substitution $\sigma \leq 1$, let us now consider the case where $\sigma > 1$. Using equation (9), we can write

$$lim_{k(t)\to 0} g'\{k(t)\} = \infty \; and \; lim_{k(t)\to\infty} g'\{k(t)\} = A. \tag{23}$$

Observe that the Inada condition in assumption 2 in Acemoglu (2009, p. 33) is violated when $k(t) \to \infty$. This raises the possibility of there being sustained economic growth in our creative region. Now, consistent with the analysis undertaken in section 5, let us concentrate on two specific cases.

The first case is where the inequality $\delta + \rho > A$ holds. Since $g'\{k(t)\}$ is a decreasing function, we infer that there exists a unique steady state equilibrium denoted by (c^{SS}, k^{SS}) which is the solution to the equations

$$g'\{k^{SS}\} = \delta + \rho \; and \; c^{SS} = g\{k^{SS}\} - (\delta + m)k^{SS}. \tag{24}$$

Because the model we are analyzing here is very similar to the neoclassical economic growth model discussed in Acemoglu (2009, pp. 287-326), some thought tells us that the steady state equilibrium in the case we are studying is saddle-path stable. This means that the equilibrium trajectory $\{c(t), k(t)\}_{t=0}^{\infty}$ converges to the steady state given by (c^{SS}, k^{SS}). Clearly, this last finding tells us that in the limit, the physical capital per creative class member's creative capital ratio approaches a *constant*. Therefore, sustained economic growth in our creative region is *impossible*.

Moving on to the second case, we now work with the condition $\delta + \rho \leq A$. In this instance, from the Euler equation, we deduce that $\dot{c}(t)/c(t) > 0$ as long as $k(t) > 0$. As such, it follows that $lim_{t\to\infty} c(t) = \infty$. Given equation (18), this last finding about the limiting value of consumption can hold only if $lim_{t\to\infty} k(t) = \infty$. If the $k(t)$ ratio approaches infinity in the limit then, using the Euler equation, we deduce that

$$lim_{t\to\infty} \frac{\dot{c}(t)}{c(t)} = \frac{1}{\theta}\left[lim_{k(t)\to\infty} g'\{k(t)\} - \delta - \rho\right] = \frac{1}{\theta}(A - \delta - \rho). \tag{25}$$

Equation (25) and the discussion thus far in this second case lead to two results. First, consumption per creative class member's creative capital and physical capital per creative class member's creative capital both approach infinity in the limit and so consumption per creative class member's creative capital grows asymptotically at the rate $(A - \delta - \rho)/\theta$. Second, this means that in our creative region, asymptotically sustained economic growth *does* occur.

Summarizing the discussion in this section, our central conclusion is that if σ and A are sufficiently large, i.e., if $\sigma > 1$ and $A \geq \delta + \rho$, then there is sustained economic growth in our creative region that is driven by the activities of the creative capital possessing members of the creative class. Our penultimate task in this chapter is to analyze what happens to the share of physical capital in our creative region's total income.

7. Physical Capital's Share of Regional Income

We begin with a definition and a result that we shall use later in this section. To this end, let $\phi \equiv g\{k(t)\}/k(t)$. Also, differentiating $g\{k(t)\} = A\left\{1 + k(t)^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}$ with respect to $k(t)$, we get $g'\{k(t)\} = A^{\frac{\sigma-1}{\sigma}}\phi^{\frac{1}{\sigma}}$.

The share of physical capital in our creative region's income---see equation (3)---is given by

$$\frac{kr}{q} = \frac{kg'\{k\}}{g\{k\}} = \left(\frac{A}{\phi}\right)^{\frac{\sigma-1}{\sigma}}, \tag{26}$$

where we have used the derivative indicated in the preceding paragraph to simplify this equation. Now, recalling the definition of ϕ and inspecting equation (26), we see that ϕ is decreasing towards A and therefore physical capital's share of our creative region's income approaches and, in the limit, equals unity. This means that the share of our creative region's income that goes to creative capital decreases over time and equals *zero* in the limit. The reader will understand that this is *not* a meaningful result for a regional economy such as ours where we are interested in studying how the creative capital possessing creative class drives regional economic growth.

Hence, to obtain a meaningful limiting result for the share of our region's income that goes to creative capital, we will need to alter some aspects of the model delineated in section 2. We now proceed to do so by following the methodology described in Rebelo (1991) and in Acemoglu (2009, pp. 395-398).[10] The basic idea is to utilize two different production functions, one for the

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An alternate way of obtaining a meaningful result for the share of our creative region's income that goes to creative capital is delineated in Acemoglu (1991, pp. 393-394).

investment good and the second for the consumption good. To this end, suppressing the time dependence of the relevant variables, suppose that the investment good I is produced with a CES production function that can be expressed in its extensive form as

$$I = A\left\{R_I^{\frac{\sigma-1}{\sigma}} + K_I^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{\sigma-1}}, \tag{27}$$

where A is a positive coefficient. In addition, suppose that the final consumption good C is produced with a Cobb-Douglas production function that can be written in its extensive form as

$$C = BK_C^{\beta}R_C^{1-\beta}, \tag{28}$$

where B is a positive coefficient and β is the parameter of the Cobb-Douglas production function. Finally, the temporal evolution of physical capital is given by the standard differential equation

$$\dot{K}(t) = I - \gamma K, \tag{29}$$

where γ is the constant depreciation rate. Since we are now working with two production functions, to keep the subsequent analysis tractable, we assume that there is no growth in the creative class population and therefore $m = 0$.

Except for the fact that we now have two production functions, the modified model of this section is very similar to the model that we have analyzed in sections 3 through 6 of this chapter. Therefore, an analysis very similar to what we have already conducted shows that in equilibrium, the economy of our creative region approximates a balanced growth path (BGP) as in the section II model in Rebelo (1991, pp. 502-505). This means that as far as the temporal convergence of the key model variables is concerned, we obtain

$$R_I \to 0, R_C \to R, \kappa(t) \equiv \frac{K_I(t)}{K(t)} \to \kappa^{BGP}, \frac{\dot{K}}{K} \to g_K, \frac{\dot{C}}{C} = \beta g_K, \frac{\dot{p}_I}{p_I} = -(1-\beta) g_K, \qquad (30)$$

where g_K is the *constant* growth rate of physical capital and βg_K is the *constant* growth rate of consumption.

Now note that in the version of the model that we are analyzing in this section, the share of our creative region's income that goes to creative capital does *not* approach zero but a *constant* in the limit. Why do we get this different result? The answer is in three parts. First, observe that we have a *linear* production technology---see equation (29)---for physical capital which is also the factor that is being accumulated in our creative region. Second, the linearity of the physical capital production technology tells us that the regional income share going to creative capital in the physical capital sector of our economy must go to zero but the regional income share going to creative capital in total output does *not* have to go to zero. Finally, what is salient to comprehend here is that as long as creative capital is an *essential* input in the production of the final consumption good and the Cobb-Douglas functional form in equation (28) guarantees this, the share of creative capital in our creative region's aggregate output stays bounded away from zero.

We now turn to our final task in this chapter and that is to examine what happens to the asymptotic growth rate of physical capital and consumption when an apposite authority in our creative region taxes the returns from physical capital.

8. Physical Capital Taxation

Suppose that the returns from physical capital are taxed at the rate τ by an appropriate regional authority (RA). In addition, suppose that the RA returns the proceeds from this taxation to the representative creative class household as a lumpsum transfer. In this case, the Euler equation given by (14) must be modified to

$$\frac{\dot{c}}{c} = \frac{1}{\theta}\{(1-\tau)r - \rho\}. \tag{31}$$

Now, substituting for r in equation (31) from equation (9), we get

$$\frac{\dot{c}}{c} = \frac{1}{\theta}\left[(1-\tau)\left[Ak^{\frac{-1}{\sigma}}\left\{1 + k^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{1}{\sigma-1}} - \delta\right] - \rho\right]. \tag{32}$$

Consistent with the analysis conducted in sections 5 and 6 in this chapter, let us now consider two broad cases. The first case---also see section 5---is where either $\sigma < 1$ or $(1-\tau)(A-\delta) < \rho$. From the analysis in section 5, it should be clear to the reader that even with physical capital taxation at rate τ, our creative region converges to a steady state and therefore there is *no* sustained economic growth.

The second case is where $\sigma > 1$ and $\rho < (1-\tau)(A-\delta)$. Then, assuming that the restriction $(1-\tau)(A-\delta)(1-\theta) < \rho$ holds, the equilibrium in our creative region involves sustained economic growth for both consumption per creative class member's creative capital or c and physical capital per creative class member's creative capital or k. Adapting equation (25) to this case of physical capital taxation, that rate of growth is given by $(1/\theta)\{(1-\tau)(A-\delta) - \rho\}$. So, when there is sustained economic growth in our creative region, taxing the returns to physical capital *reduces* the rate at which this growth occurs. This concludes our discussion of sustained economic growth and physical capital taxation in a creative region.

9. Conclusions

In this chapter, we analyzed the properties of economic growth in a region that was driven by the activities of Richard Florida's creative class. On the consumption side of our regional economy, we concentrated on an infinitely lived creative class household and on the production side of this same economy, we focused on a final good that was produced using physical and creative capital. In this scenario, we first defined and then characterized a competitive equilibrium for our regional economy. Second, we showed that this competitive equilibrium was Pareto optimal. Third, we established that sustained growth in this regional economy was impossible when the value of the constant elasticity of substitution parameter was less than or equal to unity. Fourth, we specified the conditions in our model that needed to hold for sustained economic growth to arise. Fifth, we studied what happened to the share of physical capital in our creative region's income. Finally, we analyzed what happened to the asymptotic growth rate of physical capital and consumption when a regional authority taxed the returns from physical capital.

The analysis in this chapter can be extended in a number of different directions. Here are two potential extensions. First, it would be useful to analyze the economic growth-related impacts of an unanticipated increase in the technology coefficient A in the CES production function given by equation (2). Second, it would also be instructive to analyze a multi-region model of economic growth in which creative class members are able to move from one region to another in response to the changing fiscal environment in one or more regions. Studies that examine these facets of the underlying problem will provide further insights into the activities of creative class members and how these activities influence economic growth in the regions in which these members are resident.

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