Richard Florida's Creative Capital in a Trading Regional Economy: A Theoretical Investigation[1]

by

Amitrajeet A. Batabyal[2]

and

Peter Nijkamp[3]

[1] We thank Roger R. Stough and the participants in an international workshop on "Human Capital, Social Capital, and Creative Capital as Sources of Regional Growth" in Free University, Amsterdam, June 30-July 1, 2008, for their comments on a previous version of this paper. In addition, Batabyal acknowledges financial support from the Gosnell endowment at RIT. The usual disclaimer applies.

[2] Department of Economics, Rochester Institute of Technology, 92 Lomb Memorial Drive, Rochester, NY 14623-5604, USA. Internet aabgsh@rit.edu

[3] Department of Spatial Economics, Free University, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands. Internet pnijkamp@feweb.vu.nl

Richard Florida's Creative Capital in a Trading Regional Economy: A Theoretical Investigation

Abstract

We first construct a theoretical model of a regional economy with two sectors. One sector uses physical and creative capital—in the sense of Richard Florida (2002)—to produce a knowledge good that is traded. The other sector uses physical and social capital to produce a good that is not traded. Second, we provide the first formal analysis of the creative capital accumulation decision faced by individuals in this regional economy and we compute the optimal length of time during which creative capital is accumulated. Next, we determine the relative return to creative capital and we use this return to conduct comparative statics exercises with our model's four parameters. Finally, we show that for a given interest rate, the relative price of the nontraded good is higher in regional economies where more creative capital is accumulated.

JEL Codes: I290, J240, R110

Keywords: Creative Capital, Knowledge Good, Nontraded Good, Regional Economy, Social Capital

1. Introduction

1.1. Human, creative, and social capital

That physical capital is a salient input in virtually all production processes has been known to economists and to regional scientists for quite some time. In addition to physical capital, the work of Mincer (1958), Arrow (1962), and Becker (1962) has stressed the important role played by *human capital* in modern production processes. As used by these three distinguished researchers, the term human capital refers to the stock of productive skills and technical knowledge embodied in labor and it is significant primarily because it is a means of production into which more investment yields additional output.

Moving beyond production processes *per se*, in contemporary times, regional scientists and urban economists—see, for instance, Glaeser (2003), Glaeser *et al.* (2001), and Shapiro (2006)—have pointed to the importance of human capital in enhancing the growth of both cities and regions. According to this view, human capital is a potent predictor of both regional and urban success because human capital enables individuals to adapt well to change and because very skilled individuals in high skilled industries are likely to come up with novel and, over time, more novel ideas. In this regard, it is germane to note that the work of Glaeser (1994) clearly demonstrates that the generation of new ideas is significant and that there is a clear nexus between the skills possessed by city residents and the growth of these cities. This discussion tells us that from the standpoint of production, both physical and human capital are important. In addition, human capital plays a particularly salient role in enhancing the growth of cities and regions.[4]

---

[4] Recently, Camagni (2008) and Capello *et al.* (2008) have introduced the notion of "territorial capital" to describe the productivity enhancing potential of all local and spatially banded characteristics in a region. This broader concept of capital can subsume in it both physical and human capital.

In recent times, in addition to the two kinds of capital that we have just discussed, researchers interested in studying the growth of cities and regions have focused on two other kinds of capital, namely, *creative* and *social* capital. Therefore, we first discuss the concept of creative capital and then we shall focus on the notion of social capital. The concept of creative capital was popularized by Richard Florida (2002) in his best selling book *The Rise of the Creative Class*. According to Florida, the *creative class*—comprising professionals such as doctors, lawyers, scientists, engineers, university professors, and, notably, bohemians made up of artists, musicians, and sculptors—possesses *creative capital* and this group produces ideas, information, and technology and it is these outputs that are increasingly important for the growth of cities and regions. Consequently, cities and regions that want to succeed must attempt to attract members of this creative class who, according to Florida, are the wave of the future. In addition, Florida points out that when setting policy, city officials need to comprehend that members of the creative class tend to choose those cities that have tolerant environments, diverse populations, and good jobs.

So far so good but one important question that now arises is this: how is the concept of creative capital different from the now familiar notion of human capital? There is some dispute on this fundamental question in the literature. On one side, Glaeser (2005) has suggested that there is little or no difference between the concepts of creative and human capital. On the other side, Marlet and Van Woerkens (2007) have argued that the notion of creative capital is a *broader* concept than the notion of human capital.

Now, in empirical work, the notion of human capital is generally measured with education or with education-based indicators. The key point to note here is that although Florida's creative class possesses creative capital, as noted by Marlet and Van Woerkens (2007), the accumulation of

creative capital does *not* necessarily depend on the acquisition of formal education. In other words, while the creative capital accumulated by some members of Florida's creative class—such as doctors, engineers, and university professors—clearly does depend on the completion of many years of formal education, the same is not necessarily true of other members of this creative class such as artists, painters, and poets. Individuals in this latter group may be "born creative" and hence possess creative capital despite having completed very little or no formal education.

Given this state of affairs, our reading of the extant literature leads us to agree with the position of Marlet and Van Woerken (2007). In other words, we contend that there is little or no difference between the notions of human and creative capital when the accumulation of this creative capital—possessed by doctors, engineers, etc.—depends on the completion of many years of formal education. In contrast, there can be a lot of difference between the notions of human and creative capital when the accumulation of this creative capital—possessed by artists, sculptors, etc.—does not necessarily depend on the completion of formal education. Since creative capital is of two types, it is a broader concept than the notion of human capital.[5]

The notion of *social capital* originated in the work of Bourdieu (1986), Coleman (1988), and Putnam (2000) but, as used today, this term refers to a rather amorphous concept. Although there are many ways to define social capital, for our purpose, it is useful to think of social capital as "the product of investment strategies, individual or collective, consciously or unconsciously aimed at establishing or reproducing social relationships that are directly usable in the short or long term" (Bourdieu, 1986, p. 251). Put differently, social capital "arises because of dense interactions between

[5] In this paper we shall adopt the first interpretation of creative capital. In other words, we shall think of creative capital as a kind of capital that can only be accumulated by spending time in school, i.e., by obtaining a formal education.

social actors who create an intricate web of relational networks around themselves" (Barros and Nunes, 2008, p. 1555). When viewed in this manner, social capital can be thought of as the development potential of interactive networks.

The discussion in the previous paragraph tells us that social capital exhibits several characteristics that distinguish it from other kinds of capital. Further, like the notion of creative capital, social capital can be but does not have to be similar to human capital. This notwithstanding, for concreteness, in the remainder of this paper we shall follow Paldam and Svendsen (2000), Chou (2006), and Islam *et al.* (2008) and treat social capital as a distinct kind of capital that assists in the production of one or more final goods. With this background on human, creative, and social capital, we are now in a position to state the objectives of our paper.

1.2. Our objectives

The trinity of human, creative, and social capital has received a lot of attention in contemporary times and the academic literature on these concepts spans several disciplines and hence is, as one might expect, sizeable.[6] Even so, two points are worth emphasizing. First, there are very few *theoretical* studies that have attempted to model one or more of these concepts explicitly and in the context of a regional economy.[7] Second, to the best of our knowledge, there are *no* theoretical studies that have attempted to model the interaction between different kinds of capital and the production of final goods when the pertinent final goods are produced in a *trading* regional

---

6 For a more detailed corroboration of this claim, the reader should consult Mincer (1958, 1974), Becker (1962, 1993), Coleman (1988, 1989, 1990), Helliwell and Putnam (1995), Knack and Keefer (1997), Putnam (2000), Chin and Chou (2004), Chou (2006), Barros and Nunes (2008), and the many sources cited in these references.

7 Recently, Chin and Chou (2004) and Chou (2006) have analyzed growth models in which output is a function of physical and social capital. However, the questions addressed by these two papers are very different from the questions addressed by us in this paper.

economy.

Given this lacuna in the extant literature, in our paper, we first construct a theoretical model of a regional economy with two sectors. One sector uses physical and creative capital—in the sense of Richard Florida (2002)—to produce a knowledge good that is traded. The other sector uses physical and social capital to produce a good that is not traded. Second, we provide the first formal analysis of the creative capital accumulation decision faced by individuals in this regional economy and we compute the optimal length of time during which creative capital is accumulated. Third, we determine the relative return to creative capital and we use this return to conduct comparative statics exercises with the four parameters of our model. Finally, we show that for a given interest rate, the relative price of the nontraded good is higher in regional economies where more creative capital is accumulated.

The remainder of this paper is organized as follows. Section 2 first delineates the theoretical model of a two sector regional economy and then this section analyzes the creative capital accumulation decision faced by this region's individuals. Section 3 computes the lifetime earnings of a member of the creative class in our regional economy as a result of his optimal accumulation of creative capital. Next, this section determines the relative return to creative capital. Section 4 first uses this relative return to conduct comparative statics exercises with the four parameters of our model. Then, this section shows that for a given interest rate, the relative price of the nontraded good is higher in regional economies where more creative capital is accumulated. Section 5 concludes and discusses ways in which the research in this paper might be extended.

2. The Two Sector Model

2.1. Preliminaries

The model of this section is adapted from Blanchard (1985). Consider a trading regional economy with two sectors. One sector uses physical capital K and creative capital K_c to produce a knowledge good—such as a computer chip or a drug—that is traded. Physical capital K and creative capital K_c earn factor rewards denoted by r and r_c respectively. The other sector uses physical capital K and social capital K_s to produce a good—such as a local handicraft or a restaurant chef's meal—that is not traded. Social capital K_s earns a factor reward denoted by r_s. The interest rate in our regional economy is r. All factor rewards are expressed in terms of the tradable good. We suppose that both sectors of our regional economy have production technologies that are linear homogeneous. Therefore, we can write $r_c = r_c(r)$, where $r_c'(r) < 0$.

Individuals in our regional economy have uncertain lifetimes with instantaneous death probability denoted by π. Therefore, the reader will note that the discount *rate* in our regional economy is effectively $r + \pi$. We suppose that our regional economy is in a stationary or steady state with constant (time independent) factor rewards. Let us now focus on production in the tradable sector. In our simple model, the production of the knowledge good in the tradable sector is the primary activity of our region's creative class. However, the production of this knowledge good requires the use of creative capital and, consistent with the discussion in footnote 5, this creative capital has to be accumulated over time by acquiring a formal education (spending time in school). Therefore, our next task is to formally study this creative capital accumulation decision.

2.2. Creative capital accumulation decision

Each individual in our regional economy has a unit endowment of time. This time can be

used to work in the nontradable sector, or to work in the tradable sector (after acquiring a formal education), or to acquire a formal education. If an individual spends a time interval T in school then he accumulates an amount of creative capital given by AT^{α}, where $\alpha \in (0,1]$ is a "return to schooling" parameter. Obviously, during the time that is spent in school, all employment income is foregone. In addition, to keep the subsequent mathematics tractable, we shall abstract away from the cost of attending school.

An individual in our regional economy contemplating the creative capital accumulation decision will want to maximize the benefit from accumulating creative capital (spending time in school). This benefit consists of two terms. The first term is the individual's discounted value of earnings from creative capital accumulation starting on the first date after graduation from school, i.e., from date T onwards. Mathematically, this first term is given by $\int_T^{\infty} e^{-(r+\pi)t} AT^{\alpha}(r_c)dt$. The second term is the income foregone from working in the nontradable sector and, mathematically, this second term equals $r_s/(r+\pi)$. With this description in place, at birth $(time\ t=0)$, an individual's creative capital accumulation decision involves selecting T to solve

$$\max_{\{T\}}\left[\int_T^{\infty} e^{-(r+\pi)t} AT^{\alpha}(r_c)dt - \frac{r_s}{r+\pi}\right]. \qquad (1)$$

Inspecting the maximization problem in (1) it is clear that for a sensible interior solution to exist, there must be a T for which the integral in equation (1) exceeds $r_s/(r+\pi)$. Now, assuming an

interior solution, the first order necessary condition for an optimum to the above problem is

$$\frac{d}{dT}\int_{T}^{\infty} e^{-(r+\pi)t} AT^{\alpha}(r_c)dt = -e^{-(r+\pi)T} AT^{\alpha}(r_c) + \frac{\alpha AT^{\alpha-1}(r_c)}{r+\pi} e^{-(r+\pi)T} = 0. \qquad (2)$$

Simplifying equation (2) gives us an expression for the optimal length of time T^* during which creative capital ought to be accumulated by an individual in our regional economy. Specifically, this simplification gives us

$$T^* = \frac{\alpha}{r+\pi}. \qquad (3)$$

Inspection of equation (3) yields three straightforward conclusions. First, we see that less sharply decreasing returns to education or to the accumulation of creative capital (α close to 1) lengthens the optimal amount of time T^* spent in school. Second and in contrast, a higher effective discount rate $(r+\pi)$ shortens the optimal amount of time T^* spent in school. Finally and somewhat counterintuitively, we see that the reward to creative capital r_c does *not* affect the optimal schooling time T^*. This last result arises in our model because the reward r_c *multiplies* the first term in the benefit function—see equation (1)—that depends on T. We now proceed to shed light on aspects

of the creative class. Specifically, we first compute the lifetime earnings of a member of the creative class as a result of this member's optimal accumulation of creative capital and then we ascertain the relative return to creative capital.

3. Aspects of the Creative Class

3.1. Lifetime earnings

To compute the lifetime earnings—discounted at the rate $(r+\pi)$—of a member of the creative class who has accumulated creative capital optimally, we shall use equation (3). Substituting the value of T^* from equation (3) into the first term in equation (1) gives us an expression for the lifetime earnings that we seek. Specifically, we get

$$\int_{T^*}^{\infty} e^{-(r+\pi)t} A(T^*)^{\alpha}(r_c)dt = \int_{\alpha/(r+\pi)}^{\infty} e^{-(r+\pi)t} A[\frac{\alpha}{r+\pi}]^{\alpha}(r_c)dt = \frac{1}{r+\pi} A[\frac{\alpha}{r+\pi}]^{\alpha}(r_c)e^{-\alpha}. \qquad (4)$$

Inspecting equation (4) we see that the discounted lifetime earnings of a member of the creative class in our regional economy depends positively on the optimal length of time spent in school $[\alpha/(r+\pi)]$ and on the return to creative capital (r_c). Our next task is to determine the relative return to creative capital in our regional economy.

3.2. Relative return to creative capital

The reader will note that in equilibrium, the lifetime earnings of a member of the creative class who produces the knowledge good must be equal to the lifetime earnings of an individual with

social capital working in the nontradable sector of the regional economy under study.[8] From the discussion in the paragraph preceding equation (1) we know that the latter lifetime earnings is $r_s/(r+\pi)$. Therefore, equating this last expression with the expression on the right-hand-side (RHS) of equation (4) we get

$$\frac{1}{r+\pi}A[\frac{\alpha}{r+\pi}]^{\alpha}(r_c)e^{-\alpha}=\frac{r_s}{r+\pi}. \tag{5}$$

Simplifying both sides of equation (5) and then rearranging terms gives us an expression for the return to creative capital relative to the return to social capital. That expression is[9]

$$\frac{r_c}{r_s}=\frac{1}{A}e^{\alpha}[\frac{r+\pi}{\alpha}]^{\alpha}. \tag{6}$$

Equation (6) clearly tells us that as the optimal time spent in school or T^* increases, the return to creative capital relative to the return to social capital decreases. The way to interpret this result is as follows. In our model, T^* increases because the return to schooling parameter α increases. Now, an increase in α means that, *ceteris paribus*, schooling is a more attractive option

8 Only if this condition holds in our regional economy will there be individuals with social capital producing the nontradable good.

9 Note that the hourly earnings of a member of the creative class who has accumulated creative capital optimally or $A(T^*)^{\alpha}(r_c)$ must exceed the return to social capital r_s.

and this feature tends to increase the supply of creative capital and thereby depress the relative return to creative capital. We now use equation (6) to study the nature of the dependence of the return to social capital r_s on the four specific parameters of our model.

4. Aspects of Social Capital

4.1. Comparative statics

We want to study the nature of the dependence of the return to social capital r_s on the return to schooling parameter α, the critical capital accumulation shift parameter A, the regional interest rate r, and the instantaneous death probability π. To proceed further, it will be helpful to rewrite equation (6) in a more convenient form. Now, using the fact that $\{\alpha/(r+\pi)\}^{\alpha} = \exp[\alpha \log_e\{\alpha/(r+\pi)\}]$ and assuming that the inequality $\alpha > r+\pi$ holds, the rewritten equation (6) we seek is

$$r_s = Ae^{-\alpha}(r_c)e^{\alpha \log_e\{\alpha/(r+\pi)\}}. \tag{7}$$

Differentiating both sides of equation (7) with respect to α, A, r, and π gives us, after several steps of algebra, four comparative statics results. They are

$$\frac{dr_s}{d\alpha} > 0, \ \frac{dr_s}{dA} > 0, \ \frac{dr_s}{dr} < 0, \ \frac{dr_s}{d\pi} < 0. \tag{8}$$

Equation (8) tells us that the return to social capital *increases* when either the return to

schooling parameter (α) or the creative capital accumulation shift parameter (A) rises. To understand this result, note that a rise in either α or A results in more schooling being sought. This tends to increase the supply of creative capital and this last outcome tends to lower the return to creative capital r_c and raise the return to social capital r_s.

In contrast, when either the regional interest rate (r) or the instantaneous death probability (π) rises, the return to social capital *decreases*. This occurs for reasons that are the opposite of the ones that we have just given in the previous paragraph. Specifically, an increase in either r or π (high mortality) results in less schooling being sought. In turn, this reduces the supply of creative capital, raises the return to creative capital r_c and lowers the return to social capital r_s. The final question that remains to be answered in this paper is the following: For a given interest rate r, what is the impact of increased creative capital accumulation (increased schooling) on the relative price of the nontraded good in our regional economy? The answer is provided in the next section.

4.2. Relative price of the nontraded good

Let p denote the relative price of the nontraded good in our regional economy and let the regional interest rate r be given. Now suppose that more schooling is sought in our regional economy because of high α, high A, or low mortality π. Our analysis in section 4.1 tells us that high α, high A, or low mortality π will result in an increase in the return to social capital r_s. If r_s is higher then because the interest rate r is given, the relative price of the nontraded good p will also be higher.

In addition, assuming free trade between the region under study and other regions, the price

of the traded good will be the same both inside and outside this region. Further, if we measure the basic human input of the individuals in our regional economy with man-hours then more creative capital translates into higher measured relative productivity in the tradable sector. Put differently, higher productivity in the tradable sector goes along with a higher relative price in the nontradable sector.

Readers familiar with the contemporary literature in international economics will recognize that the result we have just obtained in the previous paragraph for a region is similar to the prominent Harrod-Balassa-Samuelson effect which says that there is "a tendency for countries with higher productivity in tradables compared with non-tradables to have higher price levels" (Obstfeld and Rogoff, 1996, p. 210).[10] This completes the discussion of the relative price of the nontraded good in our regional economy.

5. Conclusions

In this paper we conducted a theoretical analysis of a two sector model of a regional economy with social capital and creative capital in the sense of Richard Florida (2002). In this setting, we provided the first formal analysis of the creative capital accumulation decision faced by individuals in our regional economy and then we calculated the optimal length of time during which creative capital is accumulated. Next, we ascertained the relative return to creative capital and we used this return to conduct comparative statics exercises involving the four parameters of our model. Finally, we showed that for a given interest rate, the relative price of the nontraded good is higher in regional economies where more creative capital is accumulated.

---

[10] For a lucid textbook account of the Harrod-Balassa-Samuelson effect the reader should consult Obstfeld and Rogoff (1996, pp. 210-216).

The analysis in this paper can be extended in a number of different directions. In what follows, we suggest two possible extensions. First, it would be useful to analyze a model of the creative capital accumulation process in which the rewards accruing to creative and social capital are variable and not constant. Because creative capital is not "manna from heaven," it can be accrued deliberately. When thought of in this way, it should be possible to position and study the accumulation of creative capital in the context of endogenous growth theory. Second, the decision to accumulate creative capital can also be profitably studied by examining the case in which the income foregone from working in the nontradable sector is stochastic and not deterministic. Studies that analyze these aspects of the underlying problem will provide additional insights into the nexuses between alternate ways of accumulating creative capital and the workings of two sector regional economies.

References

Arrow, K.J. 1962. Economic welfare and the allocation of resources for invention, in R.R. Nelson, (Ed.), *The Rate and Direction of Inventive Activity*. Princeton University Press, Princeton, New Jersey.

Barros, C.P., and Nunes, F. 2008. Social capital in non-profit organizations: A multidisciplinary perspective, *Journal of Socio-Economics*, 37, 1554-1569.

Becker, G.S. 1962. Investment in human capital: A theoretical analysis, *Journal of Political Economy*, 70, 9-49.

Becker, G.S. 1993. *Human Capital*. University of Chicago Press, Chicago, Illinois.

Blanchard, O.J. 1985. Debt, deficits, and finite horizons, *Journal of Political Economy*, 93, 223-247.

Bourdieu, P. 1986. Forms of capital, in J.G. Richardson, (Ed.), *Handbook of Theory and Research for the Sociology of Education*. Greenwood Press, New York, New York.

Camagni, R. 2008. Regional competitiveness: Towards a concept of territorial capital, in R. Capello, R. Camagni, B. Chizzolini, and U. Fratesi, (Eds.), *Modelling Regional Scenarios for the Enlarged Europe*. Springer, Heidelberg, Germany.

Capello, R., Caragliu, A., and Nijkamp, P. 2008. Territorial capital and regional growth: Increasing returns in local knowledge. *Paper Presented at the Tinbergen Institute International Workshop*, Amsterdam, The Netherlands.

Chin, M.S., and Chou, Y.K. 2004. Modeling social infrastructure and economic growth, *Australian Economic Papers*, 43, 136-157.

Chou, Y.K. 2006. Three simple models of social capital and economic growth, *Journal of Socio-Economics*, 35, 889-912.

Coleman, J.S. 1988. Social capital in the creation of human capital, *American Journal of Sociology*, 94, S95-S120.

Coleman, J.S. 1989. *Equality and Achievement in Education*. Westview Press, Boulder, Colorado.

Coleman, J.S. 1990. *Foundations of Social Theory*. Belknap Press, Cambridge, Massachusetts.

Florida, R. 2002. *The Rise of the Creative Class*. Basic Books, New York, New York.

Glaeser, E.L. 1994. Cities, information, and economic growth, *Cityscape*, 1, 9-47.

Glaeser, E.L. 2003. The new economics of urban and regional growth, in G. Clark, M. Feldman, and M. Gertler, (Eds.), *The Oxford Handbook of Economic Geography*. Oxford University Press, Oxford, United Kingdom.

Glaeser, E.L. 2005. Review of R. Florida's *The Rise of the Creative Class*, *Regional Science and Urban Economics*, 35, 593-596.

Glaeser, E.L., Kolko, J., and Saiz, A. 2001. Consumer city, *Journal of Economic Geography*, 1, 27-50.

Helliwell, J., and Putnam, R. 1995. Economic growth and social capital in Italy, *Eastern Economic Journal*, 21, 295-307.

Islam, M.K., Gerdtham, U., Gullberg, B., Lindstrom, M., and Merlo, J. 2008. Social capital externalities and mortality in Sweden, *Economics and Human Biology*, 6, 19-42.

Knack, S., and Keefer, P. 1997. Does social capital have an economic payoff? A cross-country investigation, *Quarterly Journal of Economics*, 112, 1251-1288.

Marlet, G., and Van Woerkens, C. 2007. The Dutch creative class and how it fosters urban employment growth, *Urban Studies*, 44, 2605-2626.

Mincer, J. 1958. Investment in human capital and personal income distribution, *Journal of Political*

Economy, 66, 281-302.

Mincer, J. 1974. *Schooling, Experience, and Earnings*. National Bureau of Economic Research, New York, New York.

Obstfeld, M., and Rogoff, K. 1996. *Foundations of International Macroeconomics*, MIT Press. Cambridge, Massachusetts.

Paldam, M., and Svendsen, G.T. 2000. An essay on social capital: Looking for the fire behind the smoke, *European Journal of Political Economy*, 16, 339-366.

Putnam, R.D. 2000. *Bowling Alone*. Simon and Schuster, New York, New York.

Shapiro, J.M. 2006. Smart cities: Quality of life, productivity, and the growth effects of human capital, *Review of Economics and Statistics*, 88, 324-335.