The Impact of Human Capital and Creative Industries on Regional Growth in Romania

Anca Munteanu, PhD
Petru Maior, University of Tirgu Mures

Abstract
The paper uses Barro's 1991 model of economic growth for studying the effects of human capital and the creative industries upon economic growth in Romanian regions. This is the first inquiry in this area that takes as a study case the eight NUTS2 regions of Romania. The results show that the share of enterprises active in the creative industry has a significant positive impact on economic growth being the variable with the strongest influence on real GDP growth rates. The second variable in order of importance that has a positive influence is enrolment in secondary education. Enrolment in tertiary education has a negative effect that can be interpreted either as evidence towards the fact that a university degree without entrepreneurial action is not contributing to growth and that more appealing regions rip-off human capital endowment that generate negative externalities for less appealing regions where limited human capital contributes more to growth. The paper discusses also conditional beta-convergence aspects for Romanian development regions.
Keywords: Economic Growth, Convergence, Human Capital, Creative Industries, Romanian Regions

Introduction
The impact of human capital and the creative class on economic growth has gained attention over the last years comprising the body of research of development economics. Starting with the neoclassical growth theory developed by Solow (1956) and continuing with the endogenous theories proposed by Romer (1986); Lucas (1988); Rebelo (1991) there has been a continuous interest in unraveling the dynamics that foster or impede economic growth.
While the neoclassic model of growth presented little support from empirical data (explaining growth mainly through the exogenous impact of technology, population growth rate and the saving rate), the endogenous theories made several steps forward by modeling spillover effects(i.e. R&D activity that fosters technological advances) and government actions in imperfect competition frameworks.
Improving the quality of life, reducing poverty and inequality represents some of the spillovers that are associated to economic growth. As such, under the Structural and Cohesion Policy supported by the European Commission financial support is granted aiming to reduce disparities and create economic and social well-being at regional and national levels.
Until 2013 Romania implemented a number of programs (pre-aderation programs starting with the year 2004, and post-aderation programs from 2007 onwards) that aimed to reduce

regional disparities by improving competitiveness and employment. The question that arises is to what extend disparities have been diminished and convergence is a phenomenon that will assure the harmonization of standards of living.

In this paper we analyze conditional convergence of Romanian regions between 2005 and 2012. We take into account the effect that different regional endowments of human capital and creative industries have on regional potential of growth. By controlling for these differences we analyze if this form of conditional convergence is observable and we quantify the importance of these two variables in explaining growth dynamics. The paper proceeds as follows: a short literature review is provided aiming to present some of the most recent results in the field of economic growth. The methodology section discusses Barro's (1991) approach on modeling growth and presents the adaptation of the model to this research topic. The results focus both on descriptive and explanatory aspects on economic growth, human capital and creative industries. The conclusion part discusses the most relevant results and directions of research.

Literature Review

A vast literature on economic growth is already available as this subject is one of vital interest to both academics and practitioners that have to design economic policies. While the papers published in the early stage of research in this field focus on large numbers of countries and on global approaches, recent literature investigates growth by shifting the spotlight to smaller, regional units of analysis. Moreover, growth is analyzed by looking at the interactions of relevant variables as human capital, ICT, creative industries, social capital with different measures of economic performance. Some of the most interesting results that use national unit of analysis as the focal point for investigating growth determinants reveal the importance of human capital in achieving sustainable economic growth. Wang and Yao (2003) analyze the Chinese economy and show that the accumulation of human capital has a positive and significant effect on growth explaining more than 20% of the output increases for the analyzed period. Qadri and Wakeed (2014) propose a comprehensive macroeconomic model for Pakistan economy and show that there is a relevant impact of impact of increasing education spending upon output growth (mainly by increased worker productivity and multiplier-accelerator effects). Schündeln and Playforth (2014) focus on the effect of human capital growth (i.e growth in the average years of schooling of working age population) on real output by using state level data for India between 1961 and 2001. The results show that, after controlling for government employment, there is a positive effect of human capital growth on the real domestic product per capita at state level.

On the other hand, increasing attention is paid to occupations that have a major contribution to value addition. The work of Florida (2002); Forida et al (2008) represents a milestone for this idea as the author disentangles between an education based approach and an occupational based approach of human capital. The creative class represents an alternative proxy for skills and competences that filters occupations by using criteria associated with high skills and talent (i.e. capacity for complex problems solving, creativity, independent judgment, high level of education). Both human capital and creative occupations are found to be relevant and to have a positive impact on regional development through two different channels: human capital enhances regional income and wealth while the creative class has a positive impact on labor productivity and wages. Piergiovanni et al (2012) analyze regional development in Italy by using employment and value added growth as dependent variables in a model that captures different dimensions of creative industries (i.e. number of firms

active in the creative industries sector, trademarks and registered designs, patents and utility models, cultural and leisure amenities). The paper shows that Italian provinces benefit in terms of regional employment growth from the development of the creative industries sector. Yu et al (2014) investigate creative industries clusters in the Chinese economy between 2003 and 2008. The paper investigates downstream and upstream innovation-efficiency but also value added regional effects. The results support the hypothesis that creative industries cluster have a significant positive effect on innovation and regional growth. This paper aims to bring together these two lines of research. The objective is to provide some insight for the Romanian economy as this is the first inquiry addressing this issue.

Methodology and Data

This paper draws from Barro's (1991) seminal article that investigates if the neoclassical model of growth could explain observed economic reality by introducing the human capital component into the initial model. Moreover, Barro (1991) introduces also other elements into the regression (physical investments, fertility, government consumption expenditure, political instability, economic system).

The equation used to model the relation between economic growth determinants is:

$$\frac{\ln y(t) - \ln y(0)}{\ln y(0)} = b_0 + B_1 X + b_2 \ln y(0) \qquad (1)$$

Where Y represents real GDP/Capita, X is a vector of regional relevant variables that could influence the convergence of each region towards a particular steady state. In this article we propose a simple specification by focusing on the importance of the human capital and the creative industries component.

Results

This paper examines the relationship between real GDP/capita growth and several explanatory variables as suggested by relevant economic literature. The dependent variable is real regional GDP/capita. As the nominal values of regional GDP are available until 2012, the evolution of this series is presented in Figure 1.
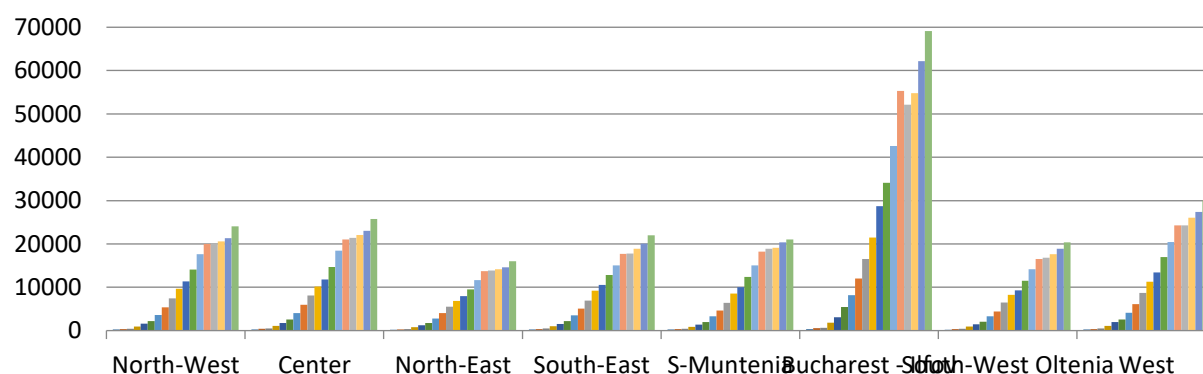

Figure 1: Real regional GDP evolution during 1995-2012

The evolution of real regional GDP/capita presents an ongoing trend of growth compared with the year 1995. The years 2008-2010 show a period of stagnation and economic decline (2009 compared with 2008 for Bucharest-Ilfov and West region). The best performing region in terms of real GDP growth is Bucharest Ilfov region. By far, the series of

GDP/capita presents in this case the highest values, almost double the value of the worst performing region which is the North-East region. At considerable distance the second best performance is seen in West and Center regions while South-West Oltenia and South-Muntenia present the lowest real per capita values.

Following the standard approach of defining human capital as educational attainment we construct three variables that capture the effect of schooling years over income growth. The first variable PRIM represents the enrolment rate to primary education relative to the population of the corresponding age group (i.e. primary education age is considered between 5 and 14 years). The variable SECOND reflects enrolment in secondary education of the population group aged between 15 and 19. Finally, TERT reflects the higher education enrolment rates aged between 20 and 30 years.

By defining human capital relative as enrolment relative to corresponding age group it is possible to obtain regional values that are greater than 1 (i.e region that will get a value greater than 1 rips off endowments of human capital from other regions). The most interesting case is that of tertiary education enrolment where we observe a high ratio of persons attending universities relative to the age population for such endeavor. For seven out of the eight regions enrolment rates are below .30% while the Bucharest-Ilfov region presents constantly values much above this threshold. Between the years 2005 and 2009 a trend of increasing enrolment rates is observable, peaking in the year 2007 at 1.039.

The values highlight the appeal that universities located in the Bucharest-Ilfov region have creating the conditions for clustering human capital, that has the potential of enhancing growth in that region. At a national level the series describe a trend of increasing enrolment rates between 2000 and 2007, followed by a sharp decrease of these rates until 2013.
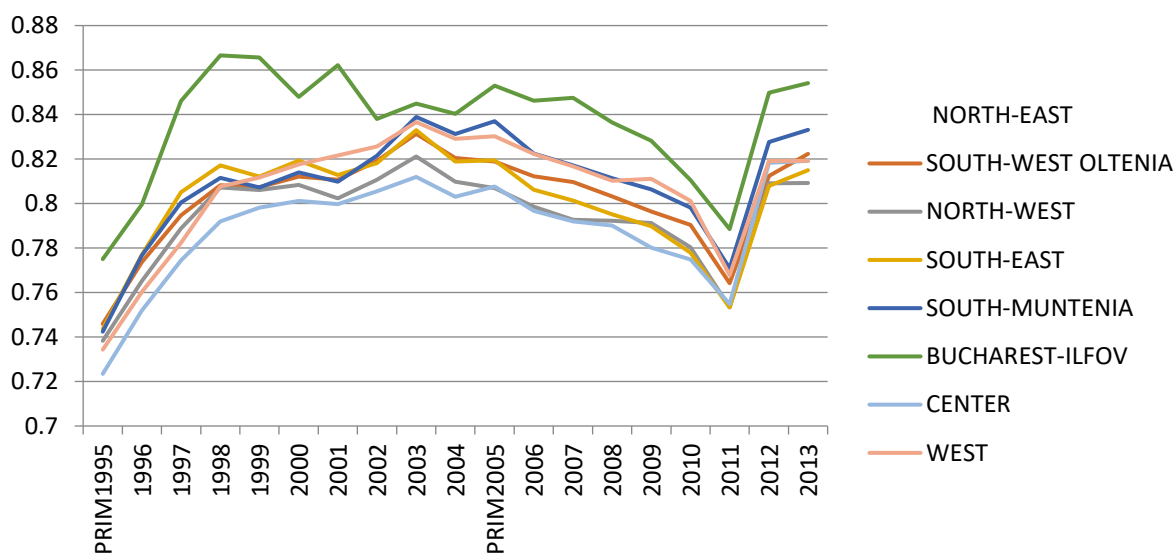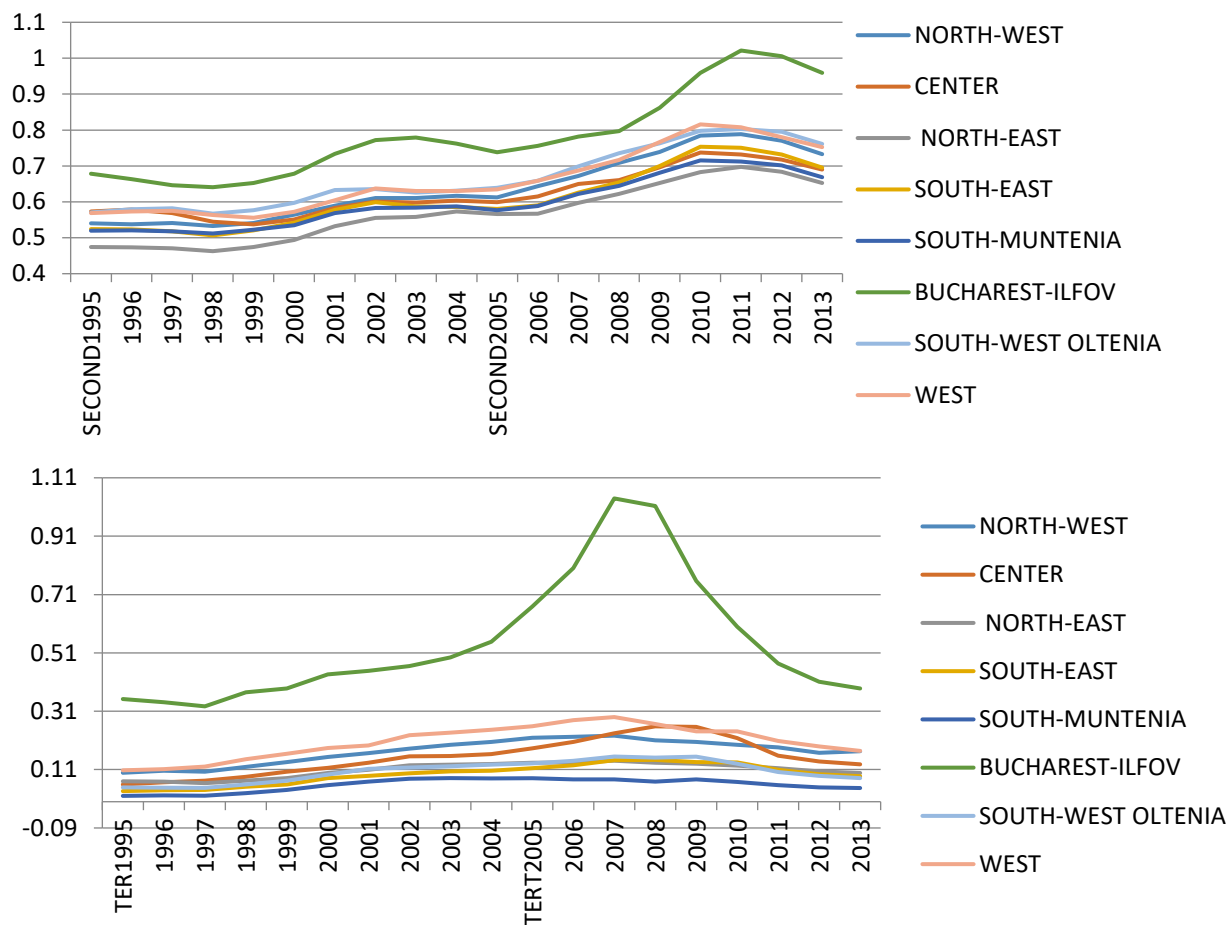

Figure 2: The evolution of enrolment rates to primary, secondary and tertiary education

Source: own prelucration using the National Institute of Statistics Data

Following Florida's definition of the creative class, we looked at Romanian occupations using available data. As such, we proxied the dimension of the creative class by using data available on the number of enterprises that are operating in creative areas. The main groups of occupations that comprise the creative industries variable are: computer and math occupations; architecture and engineering; life, physical and social science; education, training and library positions; arts and design work and entertainment, sports and media occupations. Also, management occupations, business and financial operations, legal positions, healthcare practitioners, technical occupations and high end sales and sales management were considered relevant for the creative industries variable.

Figure 3 presents the evolution of the creative class during the period 2005-2010. We computed the percentage of the enterprises that are active in the creative industry versus the total enterprises in the region.

The data shows a high degree of heterogeneity between regions regarding the spatial distribution of the creative enterprises. Bucharest-Ilfov region is clearly the leader when it comes to the creative industries distribution over the total industries in the region, while South-East Oltenia presents the region with the lowest percentages. On average the creative enterprises gain relative importance in the structure of overall enterprises as we observe a growth from 9.62% in 2005 to 17.11% in 2011. Nonetheless, the spatial dispersion of creative enterprises remains high between regions during the analyzed period.
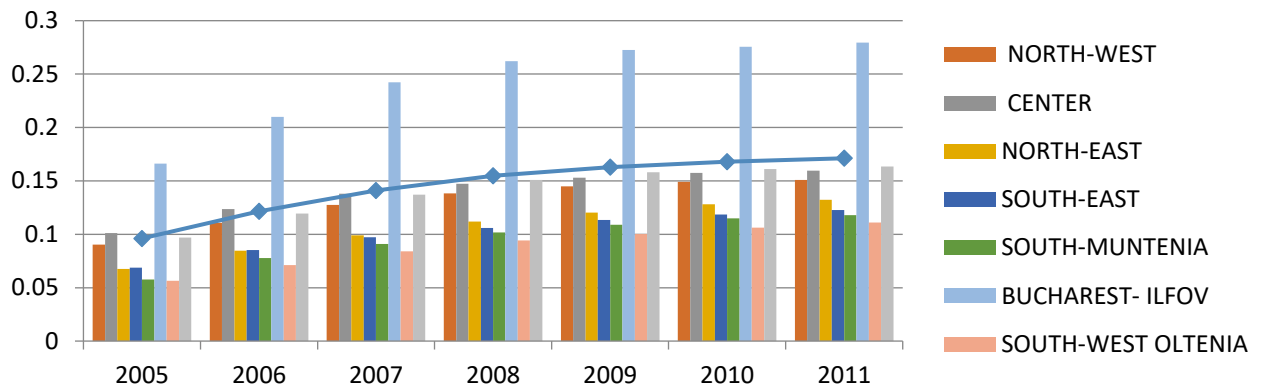
Figure 3: Share of Creative Enterprises

Further we analyze the relationship between economic growth and human capital and the creative class.

We model this relationship using Barro's (1991) specification. Because we have data on the creative industries only starting with the year 2005 we use this year as a base year of our regression. The results of the regression are presented in Table 1, estimates are corrected for heteroskedasticity.

The results displayed present evidence of a high degree of dependence between real growth rates on the one side and human capital and the creative class on the other. The highest positive impact upon growth is given by the share of creative enterprises in total enterprises. The figures show that as the weight of the creative enterprises rises the effect on real GDP growth rate is positive. By increasing the share of the creative enterprises by 1% the GDP growth rate will increase by 5.54% over a period of 8 years. The standardized beta coefficients show that for one standard deviation in the value of the share of creative enterprises the GDP growth rate will increase by 1.64 standard deviations.

The highest negative impact on the real growth rate is given, surprisingly by the share of people aged between 25-30, that are enrolled in tertiary education. This is a counterintuitive evidence that seeks an in-depth explanation. One way of interpreting the data is given by looking at how the indicator is constructed. By allowing for this value to get higher than one we observe a concentration of people aged between 25 and 30 in some regions (i.e Bucharest-Ilfov) that are perceived as having more attractive university amenities. This choice is made at the expense of other regions that are not seen as appealing. As such the higher the percentage of people leaving the region to seek higher education in another region the higher the negative impact on the regional growth rate. Another way of looking at this coefficient could suggest that higher education, per se, doesn't pay off in the Romanian economy. As already shown higher education pays off to the extent of educated people developing business in the creative industries. The data shows that by increasing the percentage of people aged between 25-30 attending a university by 1% the GDP growth rate will decline in a 8 year period with 1.15%. In terms of standardized beta coefficients, the data shows that by increasing tertiary enrolment to one standard deviation will generate a decrease in the growth rate by 1.8 standard deviations.

Table 1
Regression results
Dependent variable: Real GDP/capita growth rate 2012/2005

	Beta	Std. beta	Std. error	t-value	P>|t|	[95% Conf. Interval	
Constant	-0.90916	0.00001	0.399853	-2.27	0.151	-2.62959	0.811275
ln(pib2005)	-0.16553	-0.52815	0.096372	-1.72	0.228	-0.58018	0.24913
CE_l2005	5.542992	1.639581	0.972708	5.7	0.029	1.357766	9.728217
Prim_2005	2.971204	0.409425	0.821431	3.62	0.069	-0.56313	6.505538
Second_2005	3.161806	1.433082	0.225075	14.05	0.005	2.193388	4.130224
Tert_2005	-1.15157	-1.78843	0.12685	-9.08	0.012	-1.69736	-0.60578

F= 337,77
Prob > F   = 0.0029
R-squared   = 0.9077

Source: own prelucration

As suggested by literature, enrolment to primary and secondary education has a positive and significant effect on real growth rates. Improving enrolment rates to secondary education has a greater effect on real GDP growth as for one standard deviation in the secondary enrolment rate the GDP growth rate will improve by 1.43 standard deviations.

The only variable that doesn't have statistical significance is the natural logarithm of the real regional GDP in the base year 2005. The sign of this variable is negative, as predicted by theory, suggesting the existence of a process of beta convergence (i.e regions with lower initial levels of GDP tend to grow faster than regions with higher initial levels, converging towards a steady state). However, the t-value isn't high enough, revealing little statistical significance for the beta coefficient. Regarding the robustness of the results, the same model was estimated also for the year 2011, displaying identical results regarding the sign and the magnitude of the variables in the model on real growth. In the 2011 model the t-value for the GDP level in 2005 is -6.67, revealing statistical significance for the conditional beta-convergence phenomenon.

Conclusions
The paper uses Barro's 1991 model of economic growth for studying the effects of human capital and the creative class upon economic growth in Romanian regions. Also, the model represents a test for conditional beta convergence by looking at the sign and the significance of initial regional GDP values. The results show that the share of enterprises active in the creative industry has a significant positive impact on economic growth being the variable with the strongest influence on real GDP growth rates. The second variable in order of importance that has a positive influence is enrolment in secondary education. Enrolment in tertiary education has a negative effect that can be interpreted either as evidence towards the fact that a university degree without entrepreneurial action is not contributing to growth and that more appealing regions rip-off human capital endowment that generate negative externalities for less appealing regions where limited human capital contributes more to growth. Regarding conditional beta-convergence te obtained results are mixed. After controlling for differences in human capital and creative class endowments, in 2011 a process of beta convergence is evident while in 2012 the process lessens it's statistical significance.

The mixed results point to the fact that the period under scrutiny (2005-2012) is too short for making assertions on convergence, as such expanding the time interval is needed for more clarity on the matter.

Acknowledgements

References

Barro, R. J., (1991) Economic Growth in a Cross Section of Countries, The Quarterly Journal of Economics, Vol. 106, No. 2, pp. 407-443

Florida, R., (2002) The Rise of the Creative Class, New-York Basic books

Florida, R.; Mellander, C.; and Stolarick, K.(2008) Inside the black box of regional development: Human capital, the creative class and tolerance. Journal of Economic Geography 8:615–49.

Hengyun Li, Carey Goh, Hanqin Zhang Qiu & Fang Meng (2015) Effect of Tourism on Balanced Regional Development: A Dynamic Panel Data Analysis in Coastal and Inland China, Asia Pacific Journal of Tourism Research, 20:6, 694-713, DOI: 10.1080/10941665.2014.930055

Lucas, R. E., (1988) On The Mechanics Of Economic Development, Journal of Monetary Economics, 22 3-42.

Minh, N.K. and Khanh, P.V. (2014) Expanded Barro Regression in Studying Convergence Problem. American Journal of Operations Research, 4, 301-310. http://dx.doi.org/10.4236/ajor.2014.45029

Piergiovanni, R., Carree, M. E., & Santarelli, E. (2012). Creative industries, new business formation, and regional economic growth. Small Business Economics, 39(3), 539-560. doi:10.1007/s11187-011-9329-4

Qadri, F. S., & Waheed, A. (2014). Human capital and economic growth: A macroeconomic model for pakistan. Economic Modelling, 42, 66-76. doi:10.1016/j.econmod.2014.05.021

Rebelo, S., (1991), Long-Run Policy Analysis and Long-Run Growth, The Journal of Political Economy, Vol. 99, No. 3, pp. 500-521

Romer P.M., (1986) Increasing Returns and Long-Run Growth, The Journal of Political Economy, Vol. 94, No. 5, pp. 1002-1037

Schündeln M., Playforth,J., (2014), Private versus social returns to human capital: Education and economic growth in India, European Economic Review, Volume 66, Pages 266-283, ISSN 0014-2921, http://dx.doi.org/10.1016/j.euroecorev.2013.08.011.

Solow, R.M., (1956) A contribution to the theory of economic growth, The quarterly journal of Economics, Vol. 71 (1), pp.65-94.

Wang, Y., & Yao, Y. (2003). Sources of china's economic growth 1952 - 1999: Incorporating human capital accumulation. China Economic Review, 14(1), 32-52. doi:10.1016/S1043-951X(02)00084-6

Yu,W., Hong, J., Zhu, Y., Marinova, D., Guo, X. (2014). Creative industries agglomeration,regional innovation and productivity growth in china. 中国地理科学：英文版, 24(2), 258-268. doi:10.1007/s11769-013-0617-6