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A Tradeoff between National Income and Regional Growth: Evidence from the EU

Young-Bae Kim*

Department of Economics, Cheongju University, 298 Daesung-ro, Cheongju, Chungbuk, 360-764, South Korea; ybkim01@gmail.com

Abstract

The purpose of the paper is to empirically investigate the effect of national economic conditions on regional growth from the point of view of local economies. The study utilizes a set of cross-sectional data for sub-national regions in EU member countries. The empirical findings suggest both the existence of a tradeoff between national income and regional growth and the harmful effect of national income on regional convergence. Another finding also confirms the ineffectiveness of EU regional policies, measured by EU structural funds.

Keywords: National Income, Regional Cohesion, Regional Growth, Structural Funds, Unemployment

1. Introduction

Regional cohesion has recently been the subject of unremitting interest in the literature. The possibility cannot be ignored that without successful regional cohesion European economic integration would end up with undesirable consequences. In this paper, let me argue that the failure of EU regional cohesion is likely to be an alternative candidate for main causes of the Eurozone crisis and also seek empirical evidence of systematic causes for divergence or non-convergence between EU regions.

No one predicted the sheer size of the global financial crisis in the beginning when the failure of sub-prime mortgages stroked the US economy in 2008. Moreover, contagion of such banking failures developed fears of a sovereign debt crisis in a number of EU members in late 2009. Causes of the current Eurozone crisis can be summarized as follows: Banking system bailouts transferring property-bubble induced private debts to sovereign debts, high wage and pension commitment in the public sector, ill-managed social benefits, the structure of the Eurozone as a single currency union without fiscal union, and the political system that impedes the ability of EU leaders and the ECB to respond to shocks swiftly.

Does the EU simply need to overcome such problems in order to get through the Eurozone crisis or at least survive? Can this artificially integrated economy deliver sustainable economic growth to its member countries? How to achieve regional cohesion among EU regions successfully? We all know that it would be very difficult to find right answers to all these questions. However, there would unfortunately be a 'hidden systematic trap' that is another complicated challenge to the EU. In this paper, I will reveal this systematic trap that would hinder economic growth and convergence of EU regions by looking at the role of national economic conditions in the process of regional growth.

The main argument of this paper is that regions in richer countries would on average grow slower than would those in poorer countries, *ceteris paribus*. Such a tradeoff between national income and regional growth found in this analysis is a fresh result in the growth literature. In order to focus on looking for this new relationship, it would be appropriate to control for EU regional policies and other big shocks such as the introduction of the Euro in 1999 and the EU enlargement in 2004. As a result, the empirical analysis employs EU regional data for the period of 1982-1998.

*Author for correspondence

In the rest of the paper, first I briefly review the relevant literature and address the research issues. Then I describe the EU regional data used for the analysis and report empirical findings, followed by concluding remarks.

2. Related Literature

This section briefly reviews the growth literature related to the issues that the paper addresses, such as identifying determinants of economic growth and income convergence and the effectiveness of EU regional policies.

A great deal of the growth literature has investigated, both theoretically and empirically, determinants of economic growth. In the context of determinants of growth examples include initial income, education, R&D investment, inflation, trade, government spending, fertility rates, democracy, and so forth[4,11,12,14]. These determinants I have listed are mainly common macroeconomic and socio-political factors at the national level. It is obvious that these aggregate factors must play an important role in the process of regional growth through their interaction with sub-national regional factors.

However the growth literature has been restricted itself to analysing the effects of aggregate factors on aggregate growth or of regional factors on regional growth at the same level of economies. In particular the importance of macroeconomic factors tends to be given no heed in the context of sub-national regional growth analysis. For instance all the regional effects of macroeconomic factors have been at best implicitly captured by the inclusion of country dummies into estimation regressions[3,4]. In this paper hence I empirically discover one of the potential channels through which macroeconomic conditions may influence economic growth at the regional level.

Alongside the evolution in the growth literature that investigates the explanations for growth, there has also been another expansion that analyses income convergence between countries or regions. The growth literature presents mixed findings in regard to convergence between EU local regions. Neo-classical growth theory and some of new growth models both suggest income convergence such that poor economies would systematically catch up with rich economies due to diminishing returns to capital and low costs for imitation of technologies, respectively[12,13]. Such theoretical prediction has been confirmed by empirical studies reporting income convergence between EU regions and between EU countries[3, 10].

In contrast, income divergence is claimed by some of new growth models due to increasing returns and creative destruction[1,9]. Several recent studies also report empirical evidence of non-convergence between EU regions[5,6,10]. Canova and Marcet find that income differences among EU NUTS2-level regions persist because those are reduced only by a small amount over time and claim that poorer regions stay poor[6]. The failures of EU regional policies have mainly been blamed for non-convergence of EU regional income, such as EU structural funds[5, 10].

Most empirical growth studies tend to look for determinants of regional growth at the regional level and add country specific dummies to capture all the aggregate factors that possibly have significant influences on regional growth. For this reason, the main objective of this paper is to pay more attention to the role of macroeconomic factors in the regional growth process and explicitly looking for potential channels through which economic conditions at the national level would affect economic growth of local regions as well as regional convergence. Another main objective of this paper is to test for the growth effect of EU structural funds for regional cohesion. The variable of structural funds is included for the robust test of the main findings as well.

3. Data and Empirical Methodology

In this section, I briefly describe the EU regional data and estimation methods used for the analysis.

3.1 Data

I construct a set of cross-sectional data for 118 sub-national regions at NUTS2 (Nomenclature of Statistical Territorial Units level 2) in seven EU members for the period of 1982-1998 from Regional Statistics (REGIO) in *Eurostat New Cronos*. Seven EU countries in the sample are Belgium, Germany, Spain, France, Italy, the Netherlands, and the United Kingdom. Regional data that are usable for this analysis are available from the year 1982 onwards in REGIO.

Data on the main variables of interest such as real per capita GDP (hereafter, income), wages and unemployment are constructed from Eurostat. It should be noted at the outset that the lack of appropriate price indices for individual regions causes potential measurement errors in both the growth rates and the levels of real per capita

GDP for the EU regions. The seven EU countries are chosen to get the best coverage for some limited data such as wages and unemployment rates.

Education attainment data are constructed from two sources. The database used is Barro and Lee[2] that provides educational data only at the country level and thus I use the country ratio of EU Structural Funds (including all Objectives) between 1989 and 1993 to GDP in 1989 for the analysis. On the other hand, EU structural fund data for the local regions are collected from the annual reports on structural funds published by the European Committee since 1989. However, these reports do not provide annual figures and thus dummies for EU Structural Funds 1989-93 are used at the regional level: 1 for the regions which have been granted the funds between 1989 and 1993 and 0 for the rest of the sample regions.

3.2 Regression Models

The basic estimation strategy I employ is to run Barro-type regressions of regional growth on initial regional income as well as initial country income to test the hypothesis that the rate of regional growth varies inversely with country average income and wages and also with the rate of regional unemployment, *ceteris paribus*[3].

The regression model I use is more like a typical two-dimensional equation for unbalanced panel data although the model is for cross-sectional regressions. The total number of observations is 118 individual regions within 7 EU countries. It was not convenient to add a time dimension due to the limited availability of regional wages and unemployment data for the sample period.

I apply three empirical approaches to see if estimated coefficients of interest are robust to various alternative specifications. Those are the Pooled Ordinary Least Square (POLS) model, the Random Effect (RE) model and the Fixed Effect (FE) model[7]. As the benchmark regression, firstly, I estimate pooled OLS estimators as in the standard cross-section (regional) regression model on the basis of the assumption of a common intercept for all regions or no country specific effects. Next, I use the RE panel data model. When regional observable variables are exogenous, it is appropriate to use the RE estimator. Since all regional variables are measured in the initial year, these regional variables are more likely to be predetermined and exogenous. In this sense, the RE estimator would be correct.

Finally, I adopt a two-stage process based on the FE model. At the first stage, I estimate the country specific intercepts in the FE regression. A major drawback of the FE model is the dummy variables that capture all country specific effects and thus the coefficients on the observed country variables cannot be directly estimated. In order to extract the share of country variables from the country specific effects, at the second stage, I regress those estimated coefficients on country observed variables. The FE estimator is consistent if regional variables are not exogenous. I also test for exogeneity by applying Hausman's specification test for the null hypothesis of the RE estimator against the alternative of the FE estimator[8].

Following the usual manner in growth regression models, the dependent variable is the average rate of regional growth of real per capita GDP over the period between 1982 and 1998. The main specifications to test are as follows. The coefficients on three key variables such as initial country income, country wages and regional unemployment rates all are hypothesised to be negative, implying the inverse association with regional growth. The country rate of education attainment is included to reflect the effect of the stock of human capital and two variables of EU structural funds are added to test if the EU regional policy has contributed to regional growth in addition to the purpose of the robustness test.

4. Empirical Findings

In this section, I report the results of regional growth regressions for EU regional data. The focus of the analysis is on the effect of national economic factors on regional growth. In Table 1, columns POLS1 and POLS2 present results of the cross-regional pooled-OLS growth estimation and column RE displays results of random effects regressions. Columns FE1 and FE2 displays results of fixed effects regressions and the last column OLS reports results of a cross-country OLS regression of country-specific coefficients obtained from the regression FE1.

4.1 Regional Convergence

Coefficients on initial regional income reflect the effect of β-convergence among EU regions. This coefficient obtained without any control variable which is not reported here is positive and statistically significant at the 1 percent level. This result indicates that there is no unconditional convergence and in fact unconditional divergence among EU regions. However, this coefficient becomes negative once controlling for the effect of country income.

Table 1. EU regional growth regressions

Regressors	POLS1	POLS2	RE	FE1	FE2	OLS of FE1Coeffs.
Regional Income	-0.00547**	-0.00971**	-0.00971**	-0.00735**	-0.00714**	
1982 (in 1,000)	(-3.04)	(-3.98)	(-4.28)	(-2.86)	(-2.89)	
Country Income	-0.00318**	-0.00921**	-0.00921**			-0.00423**
1982 (in 1,000)	(-2.36)	(-2.99)	(-3.62)			(-1.72)
Ctry*Regn Income	0.00043**	0.00081**	0.00081**	0.00057**	0.00055**	
1982 (in Mil.)	(2.75)	(3.83)	(3.99)	(2.68)	(2.67)	
Country Wages	-0.00119**	-0.00089**	-0.00089**			-0.00107*
1982 (in 1,000)	(-6.25)	(-3.50)	(-4.84)			(-1.50)
Regn Unemp Rate	-0.0240	-0.02892*	-0.02892*	-0.04*	-0.03696*	
1988	(-1.08)	(-1.27)	(-1.62)	(-1.61)	(-1.52)	
Country Rate of	0.1827**	0.15211**	0.15211**			0.185**
Schooling 1980	(19.98)	(10.36)	(10.75)			(2.50)
Regional EU Funds		-0.00302**	-0.00302**		-0.00188*	
Dummies 1989-93		(-1.79)	(-1.91)		(-1.43)	
Ctry Rate EU Funds		-0.70367**	-0.70368**			
1989-93 to GDP89		(-1.94)	(-2.88)			
Constant or	0.0427	0.11766	0.1177	Yes	Yes	0.058
Country Dummies	(2.45)	(3.22)	(3.90)			(2.80)
Adjusted R^2	0.792	0.813	(0.8256)	0.877	0.878	0.451
S.E. (Wald χ^2)	0.007	0.0065	(447.91)	0.0052	0.0052	0.0088
Included Obs.	118	118	118	118	118	7

Note : *t*-values within parentheses below the coefficients and are obtained with White heteroskedasticity-consistent standard errors & covariance whenever necessary. ** Significant at 5% and * at 10%. Critical values for χ^2 at 5% is $\chi^2(8) = 15.51$

As reported on the first row, this negative coefficient becomes statistically significant when other variables are added to regressions in POLS1 and POLS2. This outcome indicates conditional β-convergence between and within countries for EU regions. According to the RE model ,an increase of ECU 10,000 in initial regional income from one region to another across the sample EU countries reduces per capita GDP growth by almost 1 percent point per annum. FE1 and FE2 regressions with country specific effects also present negative parameters for initial regional income. Such results of FE estimations indicate regional convergence within countries.

These findings suggest that regions in the seven EU countries have clearly experienced within-country convergence during the sample period of 1982-1998. Although these regions have also experienced conditional convergence between countries, however, there exists unconditional divergence between countries.

4.2 Adverse Effects of National Income

The second row presents estimation results for the effect of national income on regional growth. The hypothesis is that the rate of regional growth varies inversely with country average income and country average wages *ceteris paribus*. On the third row, I also add the interaction term between regional income and country income.

Estimated coefficients of country income all appear with negative signs regardless of estimation methods and these coefficients are statistically significant. Regression POLS1 suggests that if other things equal, an increase in country income from the poorest country to the richest one by ECU 7,600 based on year 1982 reduces regional growth by about 0.24 percent points. The magnitude of this coefficient becomes greater in the fixed effects model as reported in the last column OLS. After controlling for EU structural funds in POLS2 and RE, moreover, its

magnitude increases threefold. This assures that country income have a negative association with regional growth for a given level of regional income.

I also obtain similar results for another main country variable, that is, country average wages reported on the fourth row, for which estimated coefficients all are negative and statistically significant. This adverse impact of country wages on regional growth tends to be much weaker than the adverse effect of country income. These findings confirm the hypothesis that regions in richer countries would growth slower than regions in poorer countries if other things equal. This main finding would also imply that higher income countries may on average grow slower. Hence, my paper also provides another explanation for income convergence between countries through investigating the interaction between aggregate and local economies.

In addition to its direct adverse effect on regional growth, the country income appears to have an unfavorable influence on regional convergence. Estimated coefficients on the interaction term between regional and country income are positive and statistically significant in all regressions as displayed on the third row. The positive sign of these coefficients suggests that an increase in country income may hinder regional convergence in the EU because the combined coefficients on initial regional income still remain negative. This indicates that the EU has exhibited an adverse effect of country income on regional convergence between local regions in addition to its adverse impact on regional growth during the sample period.

4.3 Failures of EU Structural Funds

Finally I add the country rate of EU structural funds and regional dummies for the funds. European countries and regions have received EU Structural Funds of ECU 42,707 million (1989 prices) from 1989 to 1993 and ECU 120,280 million (1994 prices) from 1994 to 1999. EU structural funds are distributed as measures to improve regional and national welfare and regional cohesion. However, failures of EU regional policies are mainly blamed for persistent income differences within EU regions[5,6].

Since it is not convenient to measure the welfare effect of EU subsidies in this analysis, I briefly discuss the effect of such subsidies on regional growth. The results for EU structural funds obtained in this analysis suggest that EU structural funds have failed to enhance long-term growth of EU regions. Such findings for EU regional funds provide further supportive evidence for the claim of the previous studies reviewed earlier. The adverse effect of country income and wages obtained here is robust to the inclusion of these two variables for EU regional policies.

Other variables of interest are also added. The regional rate of unemployment is found to have a negative association with regional growth which are statistically significant in most of the cases. I also add a proxy for the stock of human capital that is the ratio of population at least completing secondary education to total population of 25 year old and over at the national level. As expected, coefficients on education attainment are positive and statistically significant. The Hausman tests for exogeneity favour the RE model for regional variables, which are not reported here.

5. Conclusion

Main findings of the study provide supportive evidence of a significant and substantial tradeoff between national income and regional growth. These findings threw light on the link between aggregate economic conditions and long-term growth of regional economies.

In the EU regional data, it was found that the rate of regional growth varies inversely with national average income and wages, *ceteris paribus*. Other main findings of the paper include an unfavorable impact of national income on regional convergence, adverse effects of EU structural funds on regional growth and a growth enhancing effect of national schooling for regional economies.

I interpret the main findings as evidence that compared with regions in higher income countries, those in lower income countries experienced an above-normal rate of economic performance for a given level of regional income. In so far as that is the case, regions belonging to a rich country experience slower economic growth, *ceteris paribus*, than those in a poor country, suggesting income convergence between countries on average. This interpretation is subject to the usual caveats about inferences drawn from a cross-section, although I applied several panel data analysis techniques. Despite I have been able to control for other determinants of economic growth as suggested by previous studies, it remains possible that there are other factors that might affect regional growth which are not controlled due to lack of data at the regional level.

Findings about the relationship between national income and regional growth have a potential bearing on policy-making. If there is a trade-off between national

income and regional growth, national governments would on average have been failing in choosing optimal policies for regional development and cohesion in the EU. The ultimate source of this trade-off seems to be the gap between national average income and regional income. If one or a few regions lead economic performance at the aggregate level, then this inter-regional income gap would be high and hinder regional growth. This does not necessarily obviate the need for any national subsidies to relatively poor regions, but rather it would be more appropriate to enhance balanced development across the EU regions and thereby achieve regional cohesion.

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7. References

1. Aghion P, Howitt P. A Model of growth through creative destruction. Econometrica. 1992; 60(2):323–51.
2. Barro RJ, Lee JW. International Data on Educational Attainment: Updates and Implications. CID Working Paper 42. Harvard University; 2000.
3. Barro RJ, Sala-i-Martin X. Convergence across States and Regions. Brookings Paper Econ Activ. 1991; 1:107–82.
4. Barro RJ, Sala-i-Martin X. Economic growth. McGraw-Hill; 1995.
5. Boldrin M, Canova F. Inequality and convergence in Europe's regions reconsidering European regional policies. Econ Pol. 2001; 16(32):207–53.
6. Canova F, Marcet A, The Poor Stay Poor: Non-convergence across Countries and Regions. CEPR discussion paper 1265. 1995
7. Greene WH. Economic analysis. 4th ed. Prentice-Hall Inc; 2000.
8. Hausman, JA. Specification tests in econometrics. Econometrica. 1978; 46(6); 1251–71
9. Lucas, RE. On the mechanics of economic development. J Monetary Econ. 1988 Jul; 22(1):3–42.
10. Martin C, Velazquez FJ, Funck B. European Integration and Income Convergence: Lessons for Central and Eastern European Countries. World Bank Technical Paper 514. World Bank; 2001.
11. Sala-i-Martin X. Determinants of economic growth: A cross-country empirical study. The MIT Press; 1998.
12. Segerstrom PS. Innovation, imitation, and economic growth. J Polit Econ 1991 Aug; 99(4):807–27.
13. Solow RE. A Contribution to the theory of economic growth. Q J Econ. 1956; 70(1):65–94.
14. Stern N. The determinants of growth. Econ J. 1991; 101(404):122–33.
15. The EU. Eurostat, Regional Statistics (REGIO), Eurostat New Cronos.
16. Annual reports on the structural funds, various years since 1989 European Committee.