Far-Flung Europe: What is the Economic Impact of Geography?

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1 Introduction

European countries have seven far-flung regions thousands of miles from continental Europe. Three of these regions are made up of islands in the Atlantic northwest of Africa: Portugal's Azores and Madeira, and Spain's Canary Islands. The other four regions are even farther afield. France has overseas departments (analogous to American states) in the Caribbean islands (Martinique and Guadeloupe), on the South American mainland (French Guiana), and off the southeast coast of Africa near Madagascar (Reunion).

All these regions, known as the "ultra-periphery" or the "outermost regions" in European Union parlance, have been occupied by their home country for hundreds of years, and have had the same territorial status as other parts of their country at least since the end of World War II.[1] The inhabitants are full citizens with the right to migrate to other parts of the country, and part of the same system of civil administration, social services, education, and taxes.

It is remarkable to have European territory, with European institutions and infrastructure, so far away and with such different geographical characteristics from continental Europe. This paper looks at how these regions have fared economically, and how that is related, if it is, to their isolation and climate.

Around the world, physical geography is strongly related to economic development. In a series of studies with Jeffrey Sachs and others, I have evaluated the role of geographical isolation and tropical climate in economic development (Gallup and others, 1998, Gallup and Sachs, 2000 & 2001, Gallup, Lora, and Gaviria, 2003).

A different, but complementary, approach to the role of geography in the economy is often called "New Economic Geography" (see, for example, Fujita, Krugman, and Venables, 2001). This approach emphasizes the role of economic forces in *creating* geographical differentiation of economic activity such as the growth of cities and economic networks through models of economies of scale and agglomeration. To the degree that physical geography plays a role in this work, it as a cause of differences in transportation cost or as a historical focal

[1] Some outermost regions have special rights of autonomy due to their isolation.

point for economic activity. New economic geography has focused much more on conceptual models than on empirical studies.

The empirical data suggest that geographical isolation from trade has been an economic disadvantage. Limited access to the ocean, particularly for land-locked countries far from world markets, is strongly negatively correlated with economic growth. Pure distance from world markets, while correlated with income levels, does not have a strong correlation with national economic growth. This pattern can be explained by the relative costs of overland and sea-born transport. The lion's share of international trade in goods still moves in ships. Once the goods are loaded on ship, there is a low marginal cost to sailing further. The main challenge is getting the goods to port, as well as providing efficient port facilities, and achieving the trade volume to atract shippers at a competitive rate.

We find strong negative correlations of tropical climate with income levels and growth rates in the past quarter century after controlling for other factors like quality of institutions, trade policy, colonial history, and levels of health and education.

Likely reasons for worse economic performance in the tropics are lower agricultural productivity and chronic infectious disease. The staple food crops, which are mostly varieties of grasses, are more suited to temperate climates than the tropics. An exception to this is high yield variety rice cultivation under irrigation, especially in places with volcanic soils. All crops need to be adapted to local climatic and soil conditions, but commercial agricultural research has no incentive to improve most crops for the tropics due to the lack of market demand from poor farmers. Public agricultural research focussed on the tropics is tiny and has been declining.

The most important infectious diseases in the tropics are malaria and HIV. Large scale HIV infection is economically devastating, but it is recent enough that we are only beginning to be able to quantify its impact on long-term economic growth. HIV is not geographically tied to the tropics, but the African strains have been especially deadly.

Endemic falciparum malaria is very strongly correlated with economic growth, even after controlling for general levels of health and tropical location. Effective control of malaria in the worst-affected tropical regions (which depends on the ecology of the mosquito vectors) is still an unsolved problem, except for islands, where eradication is far easier due to their self-containment.

Although the outermost regions are very far from their mother coutries, some almost half the world away, and more than half of them are tropical, as high income regions they face very different constraints than those of a typical low income tropical country. This paper will evaluate to what degree their geography nevertheless influences their economic performance.

In the next section, I discuss the geographical characteristics of outermost regions and the their income levels and growth since the 1980s. In section 3 I estimate the rate at which poorer regions catch up with richer regions in Europe to see whether the outermost regions, which in the past had relatively low incomes, have been as successful as continental European regions in catching

Table 1: Characteristics of Outermost Regions

Region	Number of Islands	Distance to capital of country (km)	Population in 2003 (000)	Surface Area (km^2)	Density (persons/ km^2)
Portugal			10,441	91,947	114
Azores	9	1500	239	2,322	103
Madeira	2	1000	242	828	292
Spain			42,005	505,997	83
Canary Islands	7	2000	1,844	7,447	248
France			61,933	632,610	98
Guadeloupe	8	6800	445	1,705	261
Martinique	1	6850	394	1,128	349
French Guiana	-	7500	181	82,455	2
Reunion	1	9400	759	2,520	301

Sources: Eurostat (2006), and Fundo de Maneio (2006, Table 1) for distances.

up. In section 4 I discuss the economic problems and prospects of the outermost regions in light of their geographical characteristics, and the last section concludes.

2 Geography and Economy of the Outermost Regions

With one exception, the outermost regions are densely populated volcanic islands. They contribute only a tiny part of their home country's territory and a small part of their population.

The Canary Islands has the biggest population of the outermost regions, comprising four percent of Spain's population. Though the regions make up a small share of their home country population, their populations are nevertheless substantial in themselves. Four of the seven regions have populations bigger than the country of Iceland (300,000).

French Guiana is the odd man out. It is not an island, sandwiched between Brazil and Surinam on the northern South American coast, nor is it volcanic. It makes up a significant part of France's territory, at 13 percent, but most of it is uninhabited jungle, having 1/45th the population density of France at two persons per square kilometer. French Guiana has, by far, the largest territory of the outermost regions and also the smallest population. It is the only outermost region that is not an established tourist destination, and it has the distinction of hosting the European Space Center, which makes a sizable economic contribution to the region. French Guiana is the only outermost region not at risk for hurricanes (a reason, besides being near the equator, for the Space Center).

The outermost regions fall into two groups based on distance and climate. The Azores, Madeira, and the Canary Islands are within two thousand miles of continental Europe. They enjoy a moderate Mediterranean climate despite their southern location due to the cooling Gulf current. The cool water also saps the strength of hurricanes approaching the islands, so that these three islands rarely face powerful storms.

France's four overseas departments are all more than 6500 kilometers away, more than three times farther away from Europe than the Azores, Madeira, and the Canary Islands. The French regions are all tropical, and at serious risk for major hurricanes (except for French Guiana).

To assess the economic performance of the outermost regions, we need data on real gross domestic product (GDP) per person over time. The European Union has real GDP data for its regions for only two recent years. It also maintains two nominal regional GDP series. The recent data on Eurostat's website covers eight years from 1995 to 2003. A historical series using an earlier national accounts methodology covers regions for most of the original European Union countries from the 1980s to 1996.[2]

Creating a consistent series of real regional GDP requires several assumptions, but none of them heroic. For each of the series, I take the ratio of regional GDP to national GDP in nominal terms and multiply this by real national GDP to obtain real regional GDP. This is tantamount to assuming that relative prices are the same throughout the country and that the composition of output is similar enough across regions to deflate by the single national GDP deflator. European countries do not have subnational price estimates for product accounts, so there is currently no way to apply region-specific deflators.[3]

After the 1980s-1996 and 1995-2003 series have been converted to real values, it is necessary to reconcile the two series. The later series uses more precise measures of output that generally increase the level of GDP in the overlapping years (1995-96). I applied the average difference in the ratios of regional to national GDP in the overlapping years to the 1980s-1996 series. This assumes that the uncounted output in the earlier series remains proportion to the levels in 1995-96.

Of the twelve countries with regional data in both GDP series, four countries start in 1980 and three in 1988. One country each has data starting in 1981, 1985, 1986, and 1991. The varying spans of GDP growth has implications for the estimation of convergence in the next section.

Details of the conversion of GDP to a single constant price series and the starting years are in the statistical appendix.

[2]The "1980s" is a slight exaggeration. West German regions only have data starting in 1991.

[3]The price level in the outermost regions relative to the rest of their countries is an important issue for assessing income levels because anecdotal evidence suggests that prices are substantially higher due to higher transport costs, and perhaps reduced competition. One estimate puts the price level in French Guiana 25% higher than in metropolitan France (Chris93, 2006). Unless there has been change in relative prices over time, though, higher prices in the outermost regions will not bias the growth rates.

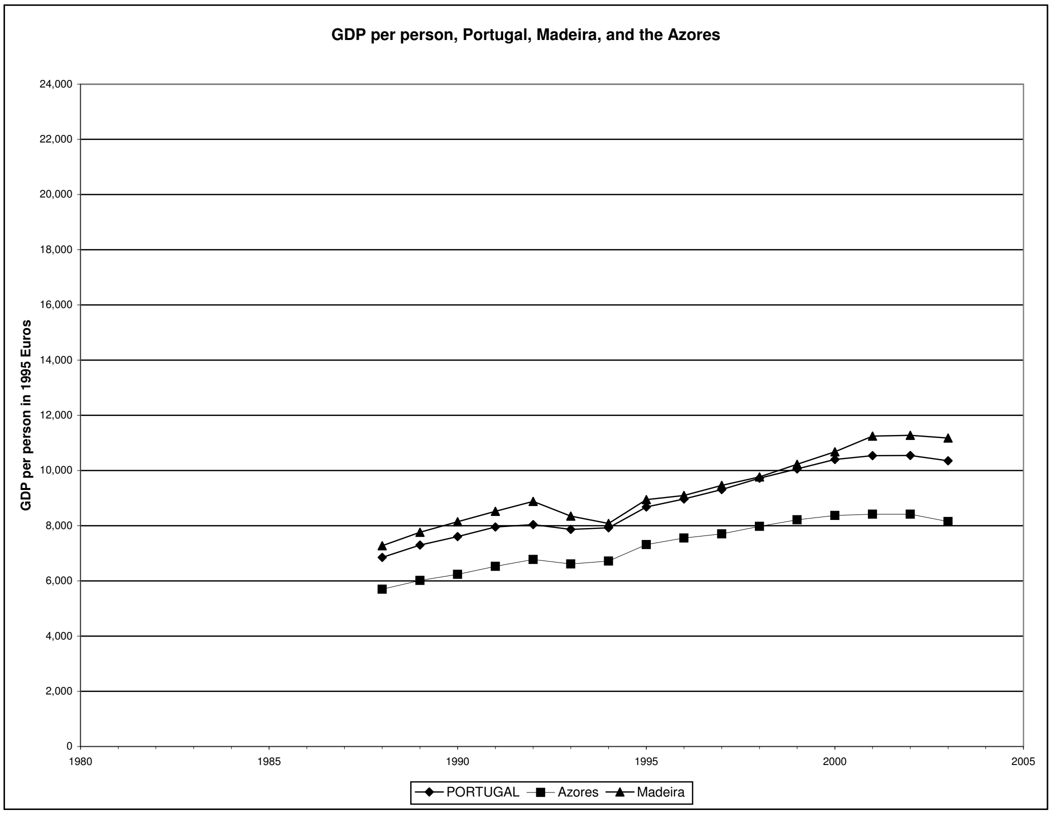


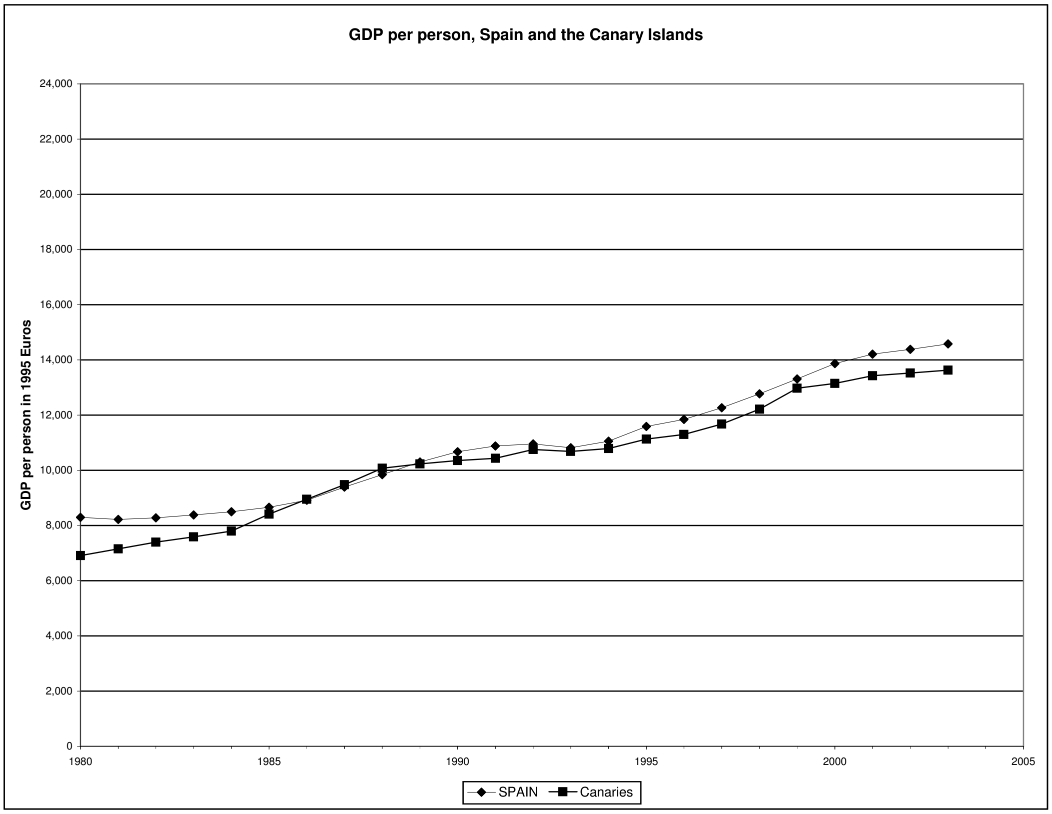
Figure 1:

Figures 1, 2, and 3 show real GDP per person from the 1980s to 2003 for each of the outermost regions as well as average national GDP per person. Madeira does quite well with an income level that is second highest in the country after Lisbon by 2003. The Azores are not as well off, with an income level 21% lower than the Portuguese national average in 2003, but it is no worse off than the Norte region.

The Canary Islands have an average income below the Spanish average, but considerably high than the continental region of Extremadura.

The French outermost regions all have much lower income levels than any region in metropolitan France. French Guiana on average has barely more than half the French average income. But when you compare to other outermost regions and poorer parts of Western Europe, they don't look so bad. All the French regions in 2003 had higher average incomes than Portugal, the Azores, and Madeira.

There are many reasons why the outermost regions may have been poorer at the time they were integrated into their countries: the history of colonization;


GDP per person, Spain and the Canary Islands
GDP per person in 1995 Euros
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
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1980
1985
1990
1995
2000
2005
SPAIN
Canaries

Figure 2:

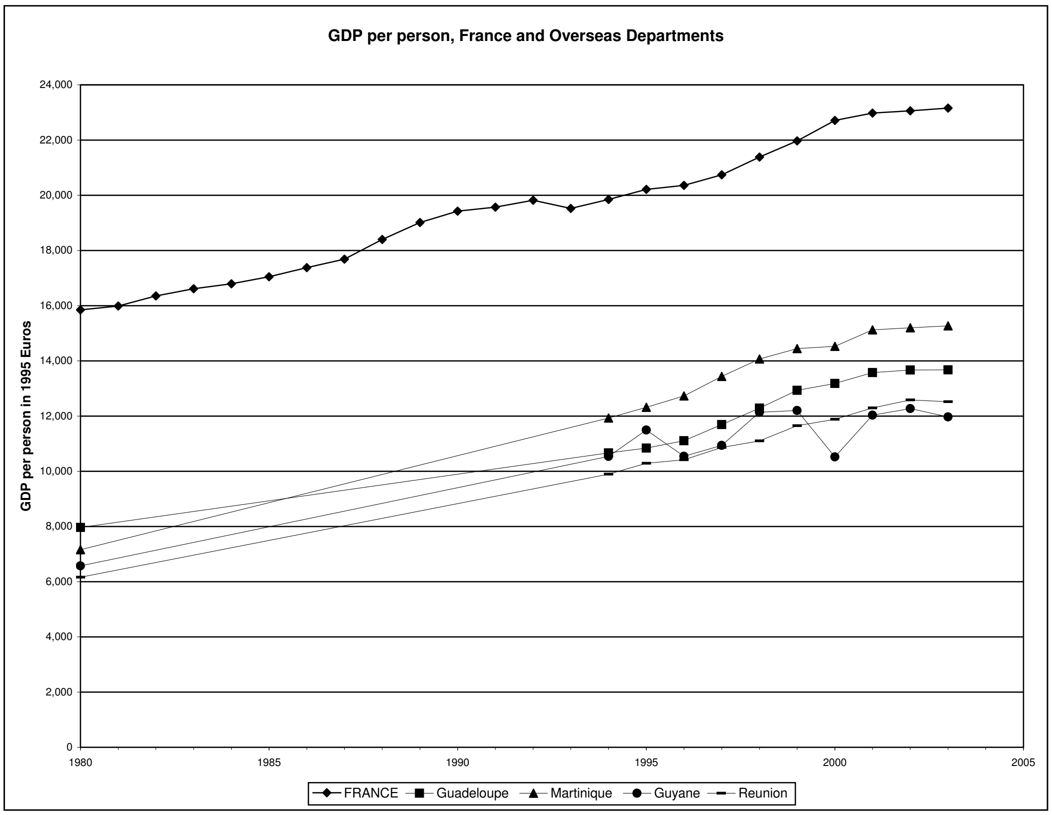

GDP per person, France and Overseas Departments
GDP per person in 1995 Euros
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1980
1985
1990
1995
2000
2005
FRANCE
Guadeloupe
Martinique
Guyane
Reunion

Figure 3:

Table 2:
GDP per Person for Outermost Regions

	GDP per Person			% of National	% of EU[1]	Growth
	1980	1988	2003	2003	2003	1980-2003[2]
France	15,849	18,403	23,161	100.0%	110.5%	1.6%
Guadeloupe	7,968	-	13,675	59.0%	65.3%	2.3%
Martinique	7,162	-	15,270	65.9%	72.9%	3.3%
French Guiana	6,573	-	11,973	51.7%	57.1%	2.6%
Reunion	6,161	-	12,525	54.1%	59.8%	3.1%
Lowest, other region (of 22)	10,651	12,788	17,758	76.7%	84.8%	2.2%
Portugal	-	6,850	10,352	100.0%	49.4%	2.9%[2]
Azores	-	5,697	8,153	78.8%	38.9%	2.6%[2]
Madeira	-	7,277	11,178	108.0%	53.4%	3.1%[2]
Lowest, other region (of 5)	-	5,697	8,153	78.8%	38.9%	2.6%[2]
Spain	8,295	9,845	14,578	100.0%	69.6%	2.5%
Canary Islands	6,911	10,078	13,627	93.5%	65.0%	3.0%
Lowest, other region (of 16)	4,819	6,120	9,550	65.5%	45.6%	3.0%
European Union[1]	-	-	20,952	-	100.0%	-

Source: Eurostat, 2006 and author's calculations.
1. 15 members prior to expansion in 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.
2. For Portuguese regions, growth is 1988-2003. See Statistical Appendix for methodology.

slavery; prison colonies in the case of French Guiana; premodern technologies made geographical isolation much more severe. For the future of the outermost regions, though, the important issue is economic growth - what are their prospects for catching up?

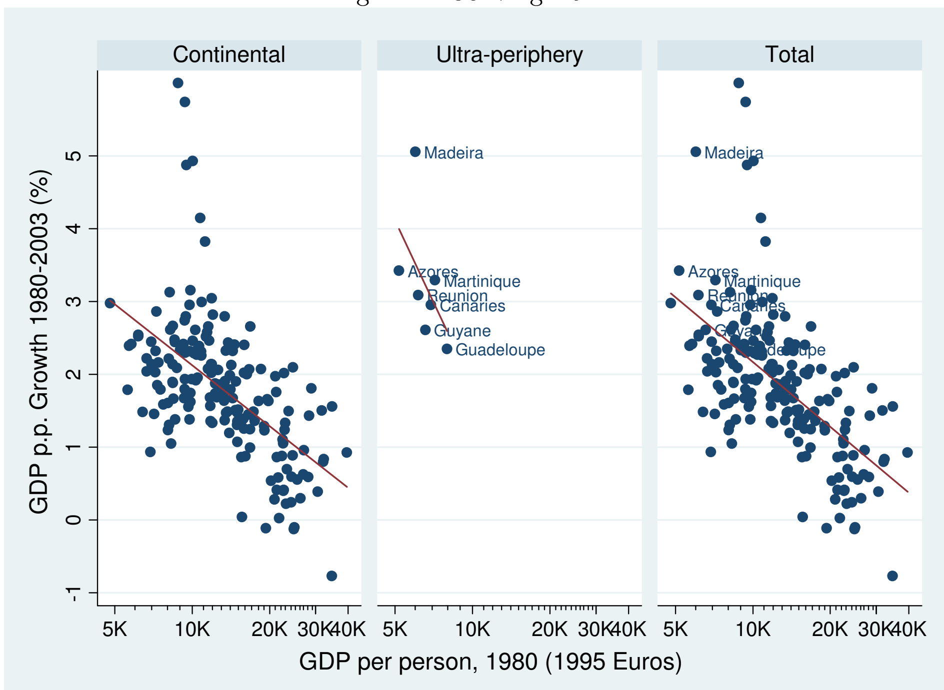
Strikingly, except for the Azores, all the outermost regions grow faster than their parent countries. For France in particular, where the gap between the outermost regions and mertripolitan regions is greatest, the growth rate of the outermost regions has steadily outpaced the rest of France, by at least 1% for the past 23 years.

3 Convergence

The seven peripheral regions historically had among the lowest income levels in Europe. But in recent times their economic growth rates have been higher than their countries . The outermost regions have been catching up.

The poorer regions within Western Europe, United States, and Japan have tended to converge to the income levels of richer regions over time (Barro and Sala-I-Martin, 1991). Here we examine whether the periphery regions of Europe have converged to the income levels of the richer parts of Europe at the same rate as poor regions in continental Europe. Has the periphery been hampered in catching up by its geographical isolation?

Figure 4: Convergence



The pattern of relatively poorer European regions growing faster than richer regions holds true in our recent data covering the last twenty years. Figure 4 shows the relationship between the level of GDP per person in the 1980s with average annual growth of GDP per person from the 1980s to 2003 for continental regions, and also for the seven regions of the outermost regions. Clearly, in both cases the regions with lower initial output levels tended to grow faster. In the ultra-periphery, if anything, poor regions seem to have caught up even faster. Given initial output levels, the growth rates in the outermost regions appear to be even higher than in other poor regions of Europe.

To test this proposition statistically, I modify the specification of Barro and Sala-I-Martin (1995). They show that a log-linear approximation of a neoclassical growth model (Solow, 1956; Cass, 1965; Koopmans, 1965) has the following form:

$$ln(\hat{y}_t) = e^{-\beta t} ln(\hat{y}_0) + (1 - e^{-\beta t}) ln(\hat{y}^*) \tag{1}$$

where $\hat{y}_t$ is output at time t per effective worker (which is the number of workers adjusted for the effect of technological progress). $\hat{y}_t = y_t e^{-xt}$, where y_t is output per person and x is exogenous technical progress. $\hat{y}^*$ is the steady state level of output per effective worker, and β is the rate of convergence to the steady state.[4]

Barro and Sala-I-Martin derive the relationship between initial output per person and subsequent growth for a set of regions where all data start in the same initial year 0 and end in the same year T. The regional data for Europe, however, starts in different years for different countries. The relationship between initial output per person and growth for data starting in year t and ending in year T becomes[5]

$$\frac{1}{T-t}(ln\, y_T - ln\, y_t) = x\left[1 + \frac{t}{T-t}(1-e^{-\beta(T-t)})\right] + \frac{1}{T-t}(1-e^{-\beta(T-t)})\, ln(\hat{y}^*/y_0)$$

Adding a random disturbance u_i , the growth rate $\gamma_i \equiv \frac{1}{T-t_i}(ln\, y_{iT} - ln\, y_{it_i})$ for region i becomes

$$\gamma_i = x\left[1 + \frac{t_i}{T-t_i}(1-e^{-\beta(T-t_i)})\right] + \frac{(1-e^{-\beta(T-t_i)})}{T-t_i}\, ln\, \hat{y}^* - \frac{(1-e^{-\beta(T-t_i)})}{T-t_i}\, ln\, y_{it_i} + u_i \tag{2}$$

Equation 2 can be estimated by nonlinear least squares for the unknown parameters x, β, and $ln\, \hat{y}^*$. The usual expedient of estimating the equation $\gamma_i = a + b\, ln\, y_{it_i} + u_i$ by ordinary least squares is not possible with our data because the starting year t_i varies across observations, so that b is not a constant parameter that can be consistently estimated.

In order to test the hypothesis that convergence is slower in the peripheral regions, we also estimate

$$\gamma_i = x\left[1 + \tfrac{t_i}{T-t_i}(1-e^{-(\beta+\Delta\beta_o d_i)(T-t_i)})\right] \quad + \tfrac{(1-e^{-(\beta+\Delta\beta_o d_i)(T-t_i)})}{T-t_i}\, ln\, \hat{y}^* - \tfrac{(1-e^{-(\beta+\Delta\beta_o d_i)(T-t_i)})}{T-t_i}\, ln\, y_{it_i} + u_i \tag{3}$$

where $\Delta\beta_o$ is the increment to β for the outermost regions, and d_i is a variable indicating whether the region is in the periphery. If $\Delta\beta_o = 0$, output per person

[4]For those uncomfortable with the closed economy assumption or other aspects of the neoclassical growth model, Blanchard in his appended comments to Barro and Sala-I-Martin (1991) shows that an equivalent estimating equation can be derived from a model of supply and demand for output with labor and/or capital mobility across regions.

[5]From the equations above,

$$\begin{aligned} ln\, y_t &= ln\, \hat{y}_t + xt \\ &= e^{-\beta t} ln\, y_0 + (1-e^{-\beta t}) ln\, \hat{y}^* + xt \end{aligned}$$

Since this also applies to $t = T$,

$$\frac{1}{T-t}(ln\, y_T - ln\, y_t) = \frac{1}{T-t}\left[(e^{-\beta T} - e^{-\beta t}) ln\, y_0 + ((^{-\beta T}) - (1-e^{-\beta t})) ln\, \hat{y}^* + x(T-t)\right]$$

Reversing the equation for $ln\, y_t$ gives us

$$^{\beta t}\left[ln\, y_t - (1-e^{-\beta t}) ln\, \hat{y}^* - xt\right]$$

Substituting out for $ln\, y_0$ and simplifying gives the result.

Table 3: Convergence Regression Estimates

	(1) 1980s-2003	(2) 1980s-2003	(3) 1980s-1995	(4) 1995-2003	(5) 1980s-2003 Fixed Effects	(6) 1980s-2003 Fixed Effects
x	0.054**	0.054**	0.101**	0.025**		
	(0.018)	(0.018)	(0.019)	(0.002)		
$ln\,\hat{y}^*$	7.16**	7.05**	6.48**	9.29**		
	(1.08)	(1.12)	(0.70)	(0.15)		
β	0.020**	0.019**	0.039**	0.014**	0.030**	0.031**
	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)	(0.003)
$\Delta\beta_{outermost}$		-0.003	0.002	0.029		-0.008
		(0.003)	(0.006)	(0.022)		(0.009)
Observations	184	184	179	179	175	175
R^2	0.87	0.87	0.63	0.29	0.45	0.45

Standard errors in parentheses

** $p<0.01$, * $p<0.05$

in the outermost regions converges to the steady state potential output at the same rate as in non-peripheral regions.

One can also allow for differing rates of technical change, x_j, and differing steady state levels of output per effective worker, $ln\,\hat{y}_j^*$, for each country j by taking deviations from country averages (fixed effect estimates):

$$\gamma_{ij} - \overline{\gamma}_j = -\frac{(1 - e^{-\beta(T-t_j)})}{T - t_j}\,(ln\,y_{ijt_j} - \overline{ln\,y}_{jt_j}) + v_{ij}$$

where the overbar means the within-country average ($\bar{\gamma}_j \equiv \sum_{i=1}^{N_j} \gamma_{ij}$) and $v_{ij} \equiv u_{ij} - \overline{u}_{ij}$. β (and $\Delta\beta_o$ in a specification analogous to Equation 3) is again estimated by nonlinear least squares.

The results of the estimation are shown in Table 3

The first regression covers the longest time series for the most regions available (184 regions in 12 countries from the 1980s to 2003). The estimate of β, 0.020, is exactly what one would expect given the remarkable consistency of estimates of convergence across regions in studies of many different countries and also across countries around the world (once other determinants of growth are controlled for). Barro and Sala-I-Martin (1995) document estimates of β for regions in seven different countries and cross-country ranging from 1.5% to 3%. A β estimated at 0.020 means that every year a poorer region is expected to catch up by 2% of the gap between GDP per person and potential GDP per person. The high R^2 of 0.87 shows that the model accounts for most of the variation in economic growth rates.

The second regression includes a separate estimate of the rate of convergence for the outermost regions. The estimate for $\Delta\beta_o$ is a slightly negative, but not close to being statistically significant.

The third and fourth regressions split up the time period into the span of the two component series: the 1980s to 1995 and 1995 to 2003. The first span shows a faster rate of convergence of 0.039, but another essentially zero estimate for $\Delta\beta_o$. The data for the short eight year span from 1995 to 2003 are clearly more noisy. They show a considerably slower rater of convergence than the previous span, at 0.014, and a large positive the estimate for $\Delta\beta_o$, but so imprecisely estimated to make it not significantly different from zero. The estimated rate of convergence for 1995-2003 is considerably lower than for the 1980s-1995, but for the outermost regions the estimated rate of convergence $(\beta + \Delta\beta_o)$ is just as large as for the first span, showing no slacking of convergence.

The first four regressions assumed that all the regions tend towards a common potential output level, with a common exogenous rate of technical change. Regressions 5 and 6 have country fixed effects that allow for different potential output levels and different rates of technical change in each country. As one would expect given the common economic forces within countries, the rate of convergence is somewhat higher, at 0.030 rather than 0.020 for the single European potential output and technical change. Output levels converge more readily for regions within countries than regions across countries. The estimate of $\Delta\beta_o$ is once again practically zero.

The estimates show no difference between convergence rates of output levels between the outermost regions and the continental regions except perhaps in the 1995-2003 period when convergence in the outermost region kept up its high rate while it slowed on the continent, but this result is not statistically significant. There is no evidence in this period that the output levels of the outermost regions catch up any more slowly than geographically accessible regions of Europe.

4 Economic prospects of outermost regions

The outermost regions have been catching up to the rest of Europe at least as fast as other poor parts of Europe. However, this is still painfully slow. A convergene coefficient of 0.02 means that it takes 35 years for half the gap between current income and potential income to be closed. Letting convergence take its course is not a quick fix. It is worthwhile speculating on ways that geography can hinder or help that process.

Geographical limitations

Both agriculture and manufacturing face special problems in the outermost regions. Agriculture is constrained by limited arable land on crowded islands, and for the French regions, by the challenge of the tropical climate. The agricultural crops that are grown (dairy and cattle farming in the Azores, banana cultivation in the Canaries, Martinique, and Guadeloupe, and sugar cane cultivation in Reunion and Guadeloupe) are probably quite vulnerable to the reduction of European agricultural subsidies which may become less politically sustainable in the future as labor costs rise.

Manufacturing, except for certain low-weight high-value items, will always struggle to be competitive given high shipping costs and high wages compared to other locations.[6] Industrial processing of goods already exported by the outermost regions makes sense, but is a limited prospect.

Luckily, neither agriculture nor manufacturing are substantial parts of economic output or employment in high income countries. For poor countries, agriculture and manufacturing have been indispensable for development: to allow these countries to feed themselves and to absorb the labor force in factories whose exports are remunerated by richer countries abroad. For the outermost regions, neither agriculture nor manufacturing are indispensible anymore, except as justified by local economic conditions. The regions have high enough income to import some or all of their food, and to ship in goods from locations with lower cost and greater scale of production.

In this light, the subsidization of shipping costs only makes sense economically if they are temporary and enable unsubsidized shipping costs to be sustained in the future. Subsidies might be justified if they make possible the creation of a new locus of industry or the achievement of a higher scale of tranport which would then survive the end of subsidies. Both these scenarios seem unlikely for the outermost regions, and would require an adept, politically-insulated administration of the subsidy program. It is difficult to justify subsidies to send products to hard-to-reach regions if they will always remain hard-to-reach. This is why cities and other concentration of activities makes sense.

Services, the crucial sector for modern economies, often depend on the establishment of networks, coordination, and building of reputations, since the quality of output can be hard to judge. Education is the foundation for competitiveness in services, so it should be a high priority in the outermost regions since their future is in the production of intangles. The government and private associations could play a productive role here, especially since networks of human contact, especially with continental Europe, are more limited in the outermost regions.

Balancing this is the revolution in communication technologies which is making remote locations, in effect, much closer. Public investments to build ever faster and more reliable communications could be very productive. Everyone in the outermost regions should be communicating over the Internet with broadband, and businesses and schools should have ready access to videoconferencing. The widespread deployment of broadband has had a dramatic impact on the remote northern reaches of Scandinavia and Canada.

Geographical advantages

The great geographical advantage of the outermost regions is their potential for tourism.

The problems of the Azores, French Guiana, and Reunion are worrisome. These are the poorest parts of the outermost regions.[7]They have had the lowest

[6]A model in Gallup and others (1998) shows that a small differential in shipping costs can have a large impact on relative production costs when imported intermediate goods are important.

[7]Although Madeira has a slightly lower GDP per person than French Guiana and Reunion in 2003, compared to their countries' average incomes they are very different. French Guiana and Reunion is the poorest regions in France, and Madeira is the second richest region in

rates of economic growth in the outermost regions from the 1980s until now, and growth has stagnated since the late 1990s. These three regions have the smallest contribution in the outermost regions to GDP from hotels and restaurants, the best proxy for tourism in the regional accounts. Unemployment is dramatically high in French Guiana and Reunion, 25% and 30% respectively, in 2003 (data for the Azores is missing), and a remarkable share (70%-75%!) of it has lasted more than 12 months. Such large shares of the workforce trying to find work, but being unable to, has a corrosive effect on societies.

5 Conclusion

Geographical isolation and the special challenges of the tropics for economic development may explain the outermost regions historically low income levels relative to Europe. But the far-flung regions have been catching up, and at just the same speed as poor regions of continental Europe. Geography does not appear to have been an obstacle to economic growth in the last twenty-five years.

The geographical obstacles to economic growth identified in past research do not constrain the outermost regions. They all have excellent ocean access for trade. All but one are islands, and they are close to major shipping routes. The twin economic problems of the tropical countries, agricultural productivity and endemic tropical disease, are not faced by outermost regions. Volcanic soils are usually highly fertile even in the tropics, and outermost regions do not face a large population of smallholders trying to grow staple crops. Disease control is always possible with sufficient public health investment and treatment facilities such as the outermost regions have; they are simply unaffordable to poor tropical countries.

Geography does influence the economic strategy for the outermost regions going forward. Geographical isolation gives a higher priority to investments in communication infrastructure, fostering of business and research networks, and the promotion of education. Tourism is the economic activity which most clearly benefits from the geographical uniqueness of the outermost region. As income levels continue to rise, tourism is likely to grow faster than the economy as a whole. Aspects of tourism like spreading information and building a community reputation have public good characters, and may deserve targetted support.

A Data Appendix

Regional data are available for European regions, including the seven outermost regions, on the Eurostat website (ec.europa.eu/eurostat) for years since the mid 1990s. A few data series, like population, go back further.

Regional GDP

Portugal.

The regional GDP data in current values are available on the Eurostat website from 1995 to 2003 under the ESA95 statistical accounts system for levels of territorial units NUTS1, NUTS2, and NUTS3. Eurostat also has regional data from 1980 to 1996 in current national currency under the earlier ESA 1979 statistical accounts system, not available on the public website at the NUTS1 and NUTS2 levels. NUTS2 corresponds to provinces and NUT3 to departments within provinces in a number of European countries. The seven outermost regions are NUTS2 territories.

To estimate the real growth of regional GDP over time, I converted the annual current values of GDP per person to ratios of national GDP per person. I then estimated real regional GDP per person by multiplying these ratios by national GDP per person in real 1995 Euro values (also from the Eurostat website). Estimating real regional GDP this way is equivalent to assuming that prices do not differ across regions within a country and that the composition of GDP does not differ across regions for the purposes of deflation since each component of national GDP has a different deflator. Price deflator estimates by region are unavailable making correction for regional price differences impossible. Even if relative prices and composition of GDP differ substantially across regions, but these differences do not change very much over time, deriving real regional product from real national product series should have small consequences for the relative regional levels and real growth rates of GDP.

For the Canary Islands and the rest of Spain, the 1980 to 1996 series is complete. For France, the four Départements d'Outre-Mer (DOM) regions (Guadeloupe, Martinique, Reunion, and French Guyana) only have regional GDP estimates for 1980 and 1994. The series is complete for all other French regions except for Corsica which starts in 1982. The DOM have data for regional GDP in 1980, but not GDP per person: the corresponding 1980 population estimates for the DOM are missing. I calculated regional GDP per person by using the regional census counts of population in 1974 and 1982 from INSEE (insee.fr) to interpolate the 1980 value assuming a constant annual growth rate of population in each region.

The GDP data for the Azores and Madeira in Portugal begin in 1988, just after Portugal joined the European Union. Differences between the pre-1995 regional boundaries and the post-1995 NUTS2 regional boundaries mean that GDP is not available for most other Portuguese regions in the 1980-1996 series.

The ESA 1979 data have definitional differences that are not strictly comparable to the ESA 1995 data. The main changes affecting regional product estimates in the definitions of investment, trade, and the hidden economy. The definition of investment was expanded in ESA 1995 to include things like intangibles (e.g. Computer software), mineral exploration, and military infrastructure. Under ESA 1995, purchases of good and services by nonresident visitors are now counted as exports, and purchases elsewhere by residents are counted as imports.

One can compare the changes due to the conversion from ESA 1979 to ESA 1995 between the two time series of regional GDP because the series overlap for the years 1995 and 1996. Comparing the ratio of regional GDP to national

GDP, the difference between the two series in the overlapping years is small for almost all the regions. In Spain, all

Net Migration

Pop1 Pop0 (Births Deaths); annual population growth minus annual natural increase, which is births minus deaths.

Regional growth data 1980-96:

Belgium 1980-96

Germany 1980-96

France 1980-96 except Corsica 1982-1994 and Guadeloupe, Martinique, Guyane, Reunion 1980-1994

Netherlands 1981-96, except 1986-1996 for Overijssel, Gelderland, Flevoland

Austria 1988-96

Portugal 1988-96

Sweden, 1985-96

UK, 1981-96 except 1980 for East Anglia and Northern Ireland

Regional growth data 1996-2003: Belgium, Czech Republic, Germany (including ex-GDR), Greece, Spain, France, Ireland, Italy, Hungary, Netherlands, Austria, Poland, Portugal, Slovakia, Finland, Sweden, United Kingdom

All regions in these countries have GDP data except for the German regions of Düsseldorf, Köln, Münster, Detmold, Arnsberg

Infant mortality 1995: Most UK regions have missing values for 1995. I have substituted predicted values for 1995 from a linear regression using 1989-1992 and 1996-2000 data for each region. For the French regions of Guadeloupe, Martinique, French Guiana, and Reunion, I have substituted predicted values for 1995 from a linear regression on 1987-1989, 1991-93, and 2000 values. Infant mortality data is missing for most Eastern European countries.

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