

José Manuel Pastor Monsálvez  
Lorenzo Serrano Martínez

# European Integration and Inequality among Countries

A Lifecycle Income Analysis

# European Integration and Inequality among Countries

## A Lifecycle Income Analysis

José Manuel Pastor Monsálvez <sup>1,2</sup>  
Lorenzo Serrano Martínez <sup>1,2</sup>

<sup>1</sup> UNIVERSITY OF VALENCIA

<sup>2</sup> VALENCIAN ECONOMIC RESEARCH INSTITUTE (Ivie)

### ■ Abstract

In this working paper we analyze the effects of the expansions of the European Union on inequality using an approach based on individuals' lifecycle incomes. Such an approach allows us to consider the effect of different national growth and survival rates on inequality. It differs from the usual analyses of inequality that focus on the evolution of current per capita income for the period. The results show that inequality in terms of permanent income was substantially less than in current per capita income at the time of all the expansions except those of the last ten years. The results point to the key role of policies that stimulate growth in the less developed countries. With an annual  $\beta$ -convergence of 2% in current income, inequality in permanent income would be one third lower.

### ■ Key words

Permanent income, inequality, European Union.

### ■ Resumen

Este documento de trabajo analiza los efectos de las ampliaciones de la Unión Europea sobre la desigualdad entre los países miembros. A diferencia de los análisis habituales de desigualdad, basados en la evolución de la renta corriente per cápita de períodos particulares, el enfoque aquí utilizado se basa en el conjunto de rentas que las personas obtienen a lo largo de la vida (renta de ciclo vital o renta permanente). Esto permite considerar el efecto que tienen sobre la desigualdad las diferencias en tasas de crecimiento económico y en esperanza de vida. Los resultados muestran que la desigualdad en renta permanente es sustancialmente menor que en renta corriente en todas las ampliaciones, salvo en las de los últimos diez años. También ponen de manifiesto el papel clave de políticas que estimulen el crecimiento en los países menos desarrollados. Con una  $\beta$ -convergencia anual del 2% en renta corriente, la desigualdad en renta permanente sería un tercio menor.

### ■ Palabras clave

Renta permanente, desigualdad, Unión Europea.

Al publicar el presente documento de trabajo, la Fundación BBVA no asume responsabilidad alguna sobre su contenido ni sobre la inclusión en el mismo de documentos o información complementaria facilitada por los autores.

*The BBVA Foundation's decision to publish this working paper does not imply any responsibility for its content, or for the inclusion therein of any supplementary documents or information facilitated by the authors.*

La serie Documentos de Trabajo tiene como objetivo la rápida difusión de los resultados del trabajo de investigación entre los especialistas de esa área, para promover así el intercambio de ideas y el debate académico. Cualquier comentario sobre sus contenidos será bien recibido y debe hacerse llegar directamente a los autores, cuyos datos de contacto aparecen en la *Nota sobre los autores*.

*The Working Papers series is intended to disseminate research findings rapidly among specialists in the field concerned, in order to encourage the exchange of ideas and academic debate. Comments on this paper would be welcome and should be sent direct to the authors at the addresses provided in the About the authors section.*

Todos los documentos de trabajo están disponibles, de forma gratuita y en formato PDF, en la web de la Fundación BBVA. Si desea una copia impresa, puede solicitarla a través de publicaciones@fbbva.es.

*All working papers can be downloaded free of charge in pdf format from the BBVA Foundation website. Print copies can be ordered from publicaciones@fbbva.es.*

La serie Documentos de Trabajo, así como información sobre otras publicaciones de la Fundación BBVA, pueden consultarse en: <http://www.fbbva.es>

*The Working Papers series, as well as information on other BBVA Foundation publications, can be found at:* <http://www.fbbva.es>

### ***European Integration and Inequality among Countries:***

#### ***A Lifecycle Income Analysis***

© José Manuel Pastor Monsálvez and Lorenzo Serrano Martínez, 2009

© de esta edición / *of this edition*: Fundación BBVA, 2009

EDITA / PUBLISHED BY  
Fundación BBVA, 2009  
Plaza de San Nicolás, 4. 48005 Bilbao

DEPÓSITO LEGAL / LEGAL DEPOSIT NO.: M-44.308-2009

IMPRIME / PRINTED BY: Rógar, S. A.

Impreso en España – *Printed in Spain*

La serie Documentos de Trabajo de la Fundación BBVA está elaborada con papel 100% reciclado, fabricado a partir de fibras celulósicas recuperadas (papel usado) y no de celulosa virgen, cumpliendo los estándares medioambientales exigidos por la legislación vigente.

*The Working Papers series of the BBVA Foundation is produced with 100% recycled paper made from recovered cellulose fibre (used paper) rather than virgin cellulose, in conformity with the environmental standards required by current legislation.*

El proceso de producción de este papel se ha realizado conforme a las normas y disposiciones medioambientales europeas y ha merecido los distintivos Nordic Swan y Ángel Azul.

*The paper production process complies with European environmental laws and regulations, and has both Nordic Swan and Blue Angel accreditation.*

## *C O N T E N T S*

1. Introduction .....	5
2. The Process of European Integration: The Key Role of Economic Growth .....	9
3. Review of the Literature on European Convergence .....	12
4. General Formulation .....	14
5. Data and Results .....	16
6. Conclusions .....	29
Appendix: Construction of Survival Rates .....	31
References .....	33
About the Authors .....	35



# 1. Introduction

WITH the entry of Romania and Bulgaria in 2007, the European Union (EU) reached the figure of 27 members and culminated, for the moment, a process of expansion which began half a century earlier when a group of six countries took the first steps in the project of European unity, and from which substantial economic and social benefits were expected. The road travelled has not been without difficulties, but it is fair to acknowledge that the result of successive expansions, always at the voluntary request of the candidate countries, shows that the advantages have clearly been greater than the possible disadvantages.

The economic dimension of the project of European unity has been fundamental from the start. Indeed the integration project is frequently criticized for the *excessive* weight of economic aspects to the *detriment* of other matters. This is undoubtedly due in part to the substantial economic benefits that countries expected (and still expect) to obtain in the long term as a consequence of the process of integration. At the present time these economic advantages associated with integration continue to be a constant incentive to progress along the path undertaken, in spite of the difficulties <sup>1</sup>.

One of the reasons given to justify the benefits of economic integration is that the progressive expansion of the markets for goods, services and factors of production (capital and labor) will generate a greater and more efficient use of European countries' resources, stimulating the economic development of the area. Few doubt the long-term advantages of economic integration for the member countries; however, the process of integration raises a series of questions that deserve an adequate response. In particular:

---

1. In fact, after the 2004 expansion, in mid-2005, French and Dutch voters rejected the treaty establishing a Constitution for Europe in national referendums, thus throwing into doubt the EU's ability to work effectively and drive integration forward. At the same time, public scepticism about future expansions began to mount and this opposition was indeed one of the reasons cited by Dutch and French opponents of the Constitutional Treaty. Many people in the *old* EU member states think that the EU has not yet successfully digested the 2004 expansion. They feel that the addition of the Central and Eastern European countries changed the nature of the Union.

- 1) Do all member countries benefit equally?
- 2) Can the more developed countries better exploit the advantages of a wider market? Or on the contrary?
- 3) Can the less developed countries, due to their lower labor costs, benefit to a greater extent from the entry of capital, foreign investment and the transfer of technology?

Answering these questions implies analyzing the economic convergence of the member countries of the EU. The fundamental question is whether European integration gives rise to a pattern of growth that generates among the member countries convergence, greater differences, or has no appreciable effect in this regard. The analysis of this phenomenon is of special relevance since one of the explicit objectives of the EU is convergence among its countries and regions, and to this end it has devoted and intends to devote a large part of its budget through instruments such as the European Regional Development Fund (ERDF) or the Cohesion Fund.

The successive expansions, analyzed in greater detail later, have involved countries already highly developed (e.g., United Kingdom, Denmark or Sweden) and others initially less developed (e.g., Ireland, Greece, Spain or Eastern Europe countries). Obviously, though perhaps for different reasons, all these nations expect to benefit from joining the EU.

At the empirical level there is little literature about the effects of the process of European integration on the convergence of the economies of the EU, and what there is is not dedicated explicitly to the analysis of the repercussions of the process on inequality in the per capita income of the member countries. Thus a first group of studies are dedicated to analyzing the evolution of economies in the fulfilment of the criteria for forming part of the Euro area (e.g., Guldager, 1997; Cappelen et al., 2003; Ertur and Koch, 2006). Another group of studies analyze convergence at regional level, rather than at country level (e.g., Quah, 1996), and in most cases do not refer to the explicit analysis of the effects of the process of European integration, but simply test for the existence of convergence among the economies analyzed. Finally a third group of studies, though dedicated to the analysis of the convergence of countries, do not analyze the collective of EU countries, but study the individual experiences of countries; the countries of the Organisation for Economic Co-operation and Development (OECD) as a whole, or all the economies of the world (e.g., Barro, Sala-i-Martin, 1992; Schultz, 1998, etc.).

Most of these studies use measures of dispersion, such as the standard deviation of the logarithm of the variable ( $\sigma$ -convergence), or analysis of

$\beta$ -convergence so as to analyze the evolution of the income disparities among economies. However regardless of the indicator used and the type of analysis of convergence, it should be pointed out that these studies are usually based on current per capita income. Although this methodology provides useful information, this approach could be enriched with a methodology that also takes into account the whole life cycle dimension. Some recent studies try to consider this issue using alternative measures. Dowrick, Dunlop and Quiggin (2003) propose their own index based on consumption and life expectancy, avoiding arbitrary weightings by means of revealed preferences; Becker, Philipson and Soares (2001, 2005) analyze inequality of welfare by giving an economic value to the gains achieved in terms of life expectancy; likewise, Philipson and Soares (2001) propose and analyze the properties of a measure of total income (Full Income Measure of Human Development).

In this study, we aim to use an approach that is also different from the conventional one, though complementary to it. It is a type of approach similar to that proposed by Serrano (2006)<sup>2</sup>. The main characteristic of the method is that it considers the lifecycle income of individuals (present value of future income) and not only the income of a specific period. By using the present value (permanent income or lifecycle income), we continue to take into account the level of current income of the period, but we also value aspects such as the different life expectancies in each country and the different pace of future growth of per capita income (which may converge much, little or not at all). The idea is that when judging inequality, it may be appropriate to consider lives as a whole, using well known tools of economic analysis like permanent income or lifecycle income, which are basic to the modern theory of consumption (Modigliani, 1986; Friedman, 1957; Modigliani and Brumberg, 1954).

A country's entry into the EU marks a structural change in its economy, whose effects can only be valued from a long-term perspective. For this reason, it is appropriate to use a lifecycle approach to analyze the effects of integration on citizens' lifecycle income, and not only on the incomes of specific periods.

The proposed approach enriches the traditional approach in that it considers that different countries may grow at different rates, and that will determine the future incomes of their inhabitants. It also allows us to consider different rates of survival of the individuals of each country, which

---

2. Pastor and Serrano (2008) have recently used this approach.



influence the number of years during which incomes are generated, and therefore the total incomes that they will obtain in the course of their lifetime. Both aspects may have important implications when judging the degree of inequality of EU economies and their evolution following the successive expansions.

The working paper is organized as follows. The next section reviews the positive effects on economic growth associated with integration and, briefly, the history of the European integration process. Section 3 reviews the existing literature on European convergence. Section 4 presents the general formulation of the approach. Section 5 presents the data and the results regarding inequality among EU countries at different moments in time. Finally the last section presents the main conclusions.

## 2. The Process of European Integration: The Key Role of Economic Growth

THE main economic objective of European integration is to increase the rate of growth of the incomes of the participating economies, the per capita income, and ultimately the well-being of the European citizens. The underlying idea is that the construction of a wider European economic and social area will benefit the participating economies.

The sources of the potential benefits associated with integration are very diverse (Viner, 1950). While integration favors greater specialization and better use of the comparative advantages of economies, it permits more extensive exploitation of economies of scale (Harris, 1984; Gasiorek, Smith and Venables, 1992; Francois, McDonald and Nordström, 1994). Also the opening-up of markets among the member countries (or the elimination of legal and customs barriers) increases competition, exerting further pressure to increase the efficiency of production (MacDonald, 1994; Caves and Barton, 1990). Countries, then, can purchase raw materials and intermediate goods on better terms, with the consequent increase in productive efficiency (Lee, 1992). Finally changes in the quantity and quality of the factors of production used can also be expected due to the greater mobility of the factors of production within the area and to increased technical progress (Maudos, Pastor and Serrano, 1999).

These potential advantages are a continued stimulus towards an even greater degree of integration among European countries. It has been a long and many-staged process of which the ultimate outcome is the European Union of 27 members, with successive phases. It would be appropriate to review such phases before undertaking the empirical analysis.

The European Union has its origin in the European Coal and Steel Community (ECSC) founded in 1951 and formed by six countries (France, the Federal Republic of Germany, Italy, the Netherlands, Belgium and Lux-

emburg). These six countries, signatories of the Treaty of Rome in 1957, were the founders of the European Economic Community (EEC), a much more ambitious project no longer limited to the coal and steel industries. Such a project led to the total abolition of customs tariffs on industrial products in 1968 and to the development of common policies (as in the case of agricultural and trade policies).

The success of the project attracted new candidates, and in 1973 the EEC expanded to nine members with the entry of Denmark, Ireland and the United Kingdom. In 1975, the EEC's field of action expanded with the development of social, environmental and regional policies, with the creation of the European Regional Development Fund (ERDF).

In the 1980s the process of expansion continued. 1981 saw the entry of Greece and 1986 those of Spain and Portugal. This expansion brought with it a greater role for regional policies, with greater budget allocations for the structural funds, with the aim of reducing the disparities of economic development among the twelve member countries. In 1986 with the signing of the Single European Act, the creation of a great single market was agreed, becoming effective in early 1993. At the end of 1990 the reunification of Germany took place, so that the *länder* belonging to the former German Democratic Republic (GDR) came to form part of the EEC.

In 1993 the European Union (EU) treaty came into force planning the creation of the Monetary Union for 1999, as well as setting in motion various institutional reforms and, once again, expanding the EU's field of action with common policies on citizenship, the Common Security and Foreign Policy (CSFP), and dispositions regarding homeland security.

At the start of 1995 three other countries joined the EU (Austria, Finland and Sweden), raising its total membership to 15. The single currency (the euro) was created on 1 January 1999, and twelve of the EU's fifteen member countries adopted it (all except the United Kingdom, Denmark and Greece, though the latter country would adopt it in 2001). In 2002 this currency physically entered into circulation.

In the mid-1990s the former people's democracies of the Soviet bloc knocked at the EU's door. As a consequence of the negotiations, which had begun in the later years of that decade, in May 2004 there was a new expansion with the entry of ten new members (Malta, Cyprus, Czech Republic, Slovakia, Hungary, Poland, Slovenia, Estonia, Latvia and Lithuania). The last expansion, for the moment, occurred in early 2007 with the entry of Romania and Bulgaria. The current European Union has, thus, 27 member states.

The reduction of the differences in standard of living among the member states and among their different regions is one of the explicit ob-

jectives of the EU. Regional policy achieves such reduction by transferring resources from the richest regions to the poorest ones, it being an instrument of economic solidarity and a tool of economic integration. After successive reforms of its operation, the EU's regional policy is intended to strengthen the Union with more clearly defined targets. All this together with the dynamic effect of the EU expansion will signify greater equality amongst its members. The European Commission itself pointed with satisfaction to the case of Ireland (currently with one of the highest per capita gross domestic products [GDPs] when at the time of its entry barely reached 64% of the EU average) as an example of what can be achieved.

The financial effort has been substantial. In the 2000-2006 period the structural funds dedicated to this purpose amounted to 213,000 million euros (one third of the EU's total spending in that period). For the 2007-2013 period the resources budgeted are approximately 308,000 million euros, or 36% of the total planned expenditure.

### 3. Review of the Literature on European Convergence

THERE is surprisingly little scientific literature about the effects of the European integration process on the convergence of European Union (EU) economies, particularly with regard to an explicit analysis of the repercussions of the integration process itself on convergence and inequality in the per capita income of the economies of the member countries following the successive expansions of the EU.

The small amount of empirical evidence available on the process of convergence in the European Union can be classified into three groups of studies. A first group, perhaps the most numerous, contains studies that in reality focus on the analysis of the criteria for entering and forming part of the eurozone. These types of studies analyze macroeconomic convergence in terms of public deficit, interest rates or inflation rate (e.g., Guldager, 1997). Another considerable part of the literature analyzes convergence in per capita income but at regional level rather than by countries (e.g., Quah, 1996) and only sometimes directly linked with the process of European integration (e.g., Ertur and Koch, 2006). Finally in a third group of studies, long-term economic growth and the convergence of the countries of Europe considered as countries is habitually subsumed in wider collectives such as the Organisation for Economic Co-operation and Development (OECD) or the world as a whole (e.g., Barro and Sala-i-Martin, 1992), or analyzed only for the case of individual experiences (recently, for example, the case of Austria in Stockhammer [2009]).

The empirical literature on the countries of the European Union indicates that convergence is not steady over time. Various factors seem to act in opposing directions, some generating convergence and others divergence. Furthermore these factors seem to have different importance for different types of countries, so the effect of integration can vary significantly among countries.

Thus the results obtained in Henrekson, Torstensson and Tortensson (1997) suggest that European integration may affect not only static efficiency through changes in resource allocation, but also long-term growth rates.

Their basic result is a fairly robust association between European integration and growth. The growth effect would be of the order of 0.6-0.8 percentage points p.a. The results also suggest that technology transfer is the main mechanism through which European Commission (EC) and European Free Trade Association (EFTA) membership affect growth.

Delgado-Rodríguez and Álvarez-Ayuso (2008) analyze the evolution of labor productivity among EU-15 countries over the 1980-2001 period. Using  $\beta$ -convergence techniques, they identify periods of nonsignificant convergence (1980-1985 and 1993-1996), as well as others of rapid and significant convergence (1986-1992 and 1997-2001) in which less productive economies tend to grow faster than more productive economies. For the whole period results are not statistically significant. Physical and human capital accumulation appear to be the main driving force behind the process. On the other hand, technological progress tends to contribute to divergence, although a change in the trend is observed at the end of the period.

Maudos, Pastor and Serrano (1999) analyze the evolution of the countries of the European Union and the impact on efficiency and productivity of the successive expansions during the 1965-1990 period. The results show that until 1990 integration was beneficial for all the participants. The countries that joined experienced substantial relative gains in efficiency, greater in all cases than those registered in the period prior to their entry. Also the total factor productivity (TFP) growth rate in the founder countries received a positive impulse with each new expansion. Kaitila (2004) analyzes both  $\sigma$  and  $\beta$  convergence and discusses the impact of EU membership. According to the results, the EU-15 countries' real per capita gross domestic product (GDP) levels, adjusted for purchasing power, converged in 1960-2001. Convergence occurred in two spells, in 1960-1973 and 1986-2001, with an interim period of stagnation. Abiad, Leigh and Mody (2007) stress that due to increasing financial integration, capital in Europe has travelled *downhill* from rich to poor countries, and has done so with gathering strength. These inflows would have been associated with a significant acceleration of income convergence. In Reza and Zahra (2008) real convergence of the ten new members' economies to the EU average income is tested by using quarterly real GDP per capita data from 1995 to 2005. Application of the unit root tests for testing absolute convergence and catching-up make it possible to conclude that the 10 new members of the EU in 2005 tend to converge towards the EU average income.

In any case, these studies are dedicated to the analysis of convergence and inequality in current per capita income and/or labor productivity. However the effects of European integration are long-term, so it is natural to use also a lifecycle approach like that described in the next section.

## 4. General Formulation

As we have already indicated, this working paper analyzes inequality within the European Union (EU) throughout its existence, using as the key variable the per capita permanent income or lifecycle income.

The per capita permanent income ( $PI_{i0}$ ) of economy  $i$  at time 0 is the discounted value of the present and future per capita current income ( $y_{it}$ ), taking into account the survival rate in each period. We define  $S_i(t, t-1)$  as the probability that a person, who is alive in period  $t-1$ , will still be alive in period  $t$ . Thus the permanent income at time 0 is defined as indicated in the following expression:

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, t-1), \quad (4.1)$$

in which we assume a common and constant interest rate,  $r$ , and that the maximum life of an individual is 120 years of age (an unrestrictive assumption).

Our analysis of inequality and convergence in permanent income provides an analytical framework permitting us to identify their determinants and their sources of possible convergence. A more formal analysis of this type of approximation and its relationship to theoretical models of growth is offered in Serrano (2006).

The approach proposed here is more complete than the traditional one because it permits the consideration that countries grow at different rates and individuals have different survival rates. All this influences:

- I) inhabitants' capacity to obtain future incomes, and
- II) the number of years during which such incomes can be generated.

To illustrate the proposed approach, let us imagine two EU countries. Currently country 1 has a lower per capita income than country 2. If country 1 grows at a faster rate than country 2, the income of country 1 will therefore be closer to that of country 2 in the future. If we were to measure inequality using not only current income, but all incomes obtained throughout the lifetime of individuals, the inequality would be less than that observed when we use only current income. A similar argument can be applied to the

situation where the countries differ in their survival rates. If individuals have a higher rate of survival in country 2, which is richer, the number of years during which incomes are generated will be greater, and thus, *ceteris paribus*, their future flow of incomes will also be greater. If we measure inequality again using not only current income, but all incomes that will be obtained throughout individuals' lives, the inequality in this case will be greater than that observed when using only current income<sup>3</sup>.

Note that, *ceteris paribus*, according to expression (4.1), countries will have higher levels of permanent income:

- the higher their initial per capita incomes ( $y_{i0}$ ), since the higher the initial income, the greater the future income flows ( $y_{it}$ ), given the rates of growth ( $g_i$ ), [ $y_{it} = y_{i0} (1 + g_i)^t$ ];
- the higher their rates of growth ( $g_i$ ), since the higher the rate of growth, the higher their future per capita incomes ( $y_{it}$ ), given the initial levels of per capita income ( $y_{i0}$ ), [ $y_{it} = y_{i0} (1 + g_i)^t$ ];
- the greater the survival rates, [ $S_i(t, t-1)$ ], since such rates will determine that incomes will be obtained for more years and that the present value of those income flows will increase; and
- the lower the rate of discount ( $r$ ), since it increases the present value of future incomes.

At empirical level, three factors will influence the inequality in permanent income:

- the initial levels of per capita current income,
- the per capita future income flows, and
- the survival rates of individuals.

Bearing this in mind, in the next section we will consider different counterfactual scenarios to evaluate separately the role of each of these determining factors. This consideration will enable us to value the effect of each of these factors on inequality and convergence in the EU.

---

3. Although the proposed approach is more complete than the traditional one based on current income, the permanent income approach obviously poses some problems: 1) it is not such a straightforward concept as current income, and 2) a number of additional assumptions (on future current incomes, life expectancy and discount rates) are needed to estimate it. For these reasons, we do not think that the permanent income approach supersedes the current per capita income one, which is a very useful and informative way to look at inequality issues. However we do believe that a permanent income analysis is a complementary, useful and suitable way to look at inequality between economies because it tries to take into account whole life cycles of representative individuals. This approach, we hope, may provide us with additional insights on the problem.



## 5. Data and Results

IN this section we present the results regarding the inequality among European Union (EU) countries at two moments in time, 1960 and 2005. The comparisons were always made using the United States as a benchmark<sup>4</sup>. All the data are taken from *World Bank Development Indicators 2006*<sup>5</sup>. A detailed discussion of how the survival rates were obtained can be found in the appendix.

Table 5.1 offers detailed data regarding life expectancies and per capita current incomes. Since we are interested in analyzing precisely the relative differences between countries, the data are shown relative to the U.S. Additionally we present the relative positions of each country in terms of current and permanent per capita income in both periods.

In respect of life expectancy at birth, the data show modest but significant differences. Thus in 1960 a country such as the Netherlands had a life expectancy 5.2% longer than the U.S., while Portugal ranked 9.1% below that level. This is a substantial difference, of the order of 15%. Among the rest of the countries the differences were smaller but appreciable. In 2005 the greatest difference was between Sweden (4% above the U.S.) and Romania (7.9% below the U.S.), a difference of 12%. There were significant changes during this period, such as the relative improvements of countries such as France, Italy, Portugal, Spain, Austria and Finland; on the other hand in other cases the evolution was less satisfactory (the Netherlands, Denmark and nearly all the eastern European countries). These differences in terms of life expectancy and the changes occurring during the period must be taken into account when valuing the levels of inequality in the EU and convergence among countries from a long-term perspective.

---

4. Using the U.S. as the benchmark economy is habitual in international work. It allows us to avoid using any EU average which could be a problem given the changing composition of the EU over time. Furthermore we avoid having to choose any specific European country. At the same time, we also obtain results on inequality within the EU as well as on the relative performance compared with the world leader economy. It has the additional advantage of using as a benchmark a country which is not directly affected by the European integration project.

5. Cyprus and Luxembourg were excluded because of information problems.

**TABLE 5.1: Current income, permanent income and life expectancy in the EU countries**  
(benchmark country = 100)

Year of EU entry	Country	Life expectancy		Current per capita income		Permanent income (historical scenario)	
		1960	2005	1960	2005	1960	2005
1951	Belgium	100.9	101.9	52.7	62.2	61.9	74.5
1951	France	100.7	103.5	54.5	62.9	62.6	74.8
1951	Germany	99.7	101.4	63.2	64.3	64.0	67.6
1951	Italy	99.1	103.3	41.6	51.6	50.3	66.0
1951	The Netherlands	105.2	101.6	62.9	62.6	65.9	63.5
1973	Denmark	103.4	100.1	88.7	84.1	87.6	80.3
1973	Ireland	99.9	101.1	34.6	78.0	79.5	191.7
1973	United Kingdom	101.9	101.4	73.4	71.0	72.8	70.0
1981	Greece	98.7	102.0	21.6	32.9	32.1	51.7
1986	Portugal	90.9	100.0	15.8	27.4	24.5	48.7
1986	Spain	99.1	103.9	26.6	41.5	40.5	68.8
1995	Austria	98.3	102.3	53.6	67.1	64.8	86.0
1995	Finland	98.6	101.7	51.3	68.1	65.7	91.8
1995	Sweden	104.6	104.0	78.4	78.6	82.3	81.9
2004	Czech Republic	100.8	97.8	22.3	17.3	18.2	13.7
2004	Estonia	98.2	92.4	14.8	15.6	15.3	15.2
2004	Hungary	97.5	93.8	9.2	15.1	14.5	23.4
2004	Latvia	100.0	92.3	9.4	13.4	13.2	17.4
2004	Lithuania	100.1	92.9	17.6	12.9	13.4	9.2
2004	Malta	98.3	101.7	8.0	25.6	27.6	101.3
2004	Poland	97.0	96.2	13.8	13.8	13.4	13.4
2004	Slovak Republic	100.7	95.5	14.8	12.7	13.0	10.6
2004	Slovenia	98.2	98.9	24.3	30.3	29.2	37.2
2007	Bulgaria	99.3	93.5	4.5	5.5	5.4	6.2
2007	Romania	93.8	92.1	5.8	6.0	5.6	5.7
—	United States	100.0	100.0	100.0	100.0	100.0	100.0
Deviation coefficient							
	EU-6 (1951)	0.024	0.010	0.161	0.085	0.101	0.074
	EU-9 (1973)	0.021	0.011	0.292	0.152	0.170	0.500
	EU-10 (1981)	0.021	0.010	0.371	0.235	0.252	0.509
	EU-12 (1986)	0.036	0.013	0.469	0.309	0.336	0.499
	EU-15 (1995)	0.035	0.013	0.420	0.278	0.302	0.430
	EU-25 (2004)	0.029	0.038	0.670	0.583	0.596	0.699
	EU-27 (2007)	0.030	0.042	0.735	0.653	0.666	0.770

Note: Permanent income calculated using individuals' rates of growth ( $g_i$ ), individual per capita income ( $y_i$ ) and individuals' survival rates ( $S_i(t,0)$ ). Discount rate = 2%.

Source: World Bank and own preparation.

In terms of per capita income the differences are of greater magnitude. In 1960 Denmark and Bulgaria were the extreme cases with per capita incomes equivalent respectively to 88.7% and 4.5% of the per capita income in the U.S. In 2005 these two countries still showed the maximum and minimum values within the group of countries currently forming the EU-27, Denmark with a per capita income of 84.1% of that in the U.S. and Bulgaria barely reaching 5.5%. Besides such considerable differences, the changes occurring during the period should also be taken into account. The extreme values show a stability which would be deceptive to consider as something general. Thus countries like Ireland, Belgium, Italy, Greece, Portugal, Austria, Finland, Hungary, Malta or Slovenia achieved substantial improvements in relative terms. Other countries like Denmark, the Netherlands, United Kingdom, Czech Republic or Sweden, however, presented a less satisfactory evolution.

This disparity of behaviors over time is significant when valuing the inequality among those countries at each moment in time; so one must take into account not only the per capita incomes at that moment, but also the present value of the per capita incomes expected in the future. With such disparate growth rates of per capita income, inequality in terms of lifecycle income can vary significantly from inequality in income of the period.

The third column of table 5.1 shows the estimations of per capita permanent income based on the *historical scenario*. In such scenario, according to expression (4.1), the initial per capita income and the survival rates are used for each country. Also we use a long term growth rate based on the assumption that per capita income grows at the mean rate achieved during the 1960-2005 period. Finally to convert future incomes to present values we use a discount rate of 2%.

In 1960 permanent income varied between the value for Denmark (87.6% of the U.S.'s) and that for Bulgaria (5.4% of the U.S.'s). It would seem, therefore, that considering the lifecycle is not too important given that the results for both extreme cases are similar to those obtained using simply the current income for 1960. However when we observe what happens in the other countries and not only in the extreme cases, we see important changes. Though all the countries are below the U.S., their relative positions change substantially if current income or permanent income is considered. Among others, Belgium, France, Italy, Greece, Portugal, Spain, Austria, Finland, or especially Malta and Ireland improve considerably when permanent income is considered<sup>6</sup>. Thus, for example, Ireland goes from

---

6. The results for Malta and Ireland (both countries showing an estimated permanent income greater than the U.S. in 2007) are due to applying the previous long-run rate of growth in this

34.6% of the U.S.'s to 79.5%; Spain from 26.6% to 40.5%, or Italy from 41.6% to 50.3%. On the other hand, there are countries such as the United Kingdom or Denmark where the opposite occurs, and others where the improvement is unimportant (e.g., Germany, the Netherlands or Poland). In 2005 something similar occurs, and it is easy to see that the ranking of countries will change considerably if permanent income is considered instead of current income.

The above results show the existence of differences in terms of life expectancy and economic growth rates among European countries which justify the interest in adopting a permanent income approach to analyze inequality in the EU. Also the estimations of permanent income indicate that the results can differ in many countries from those habitual in exercises based on current income. For this reason, we will analyze the evolution of inequality among countries within the EU throughout the period, and the possible changes associated with the various expansions thereof, with this lifecycle perspective always in mind.

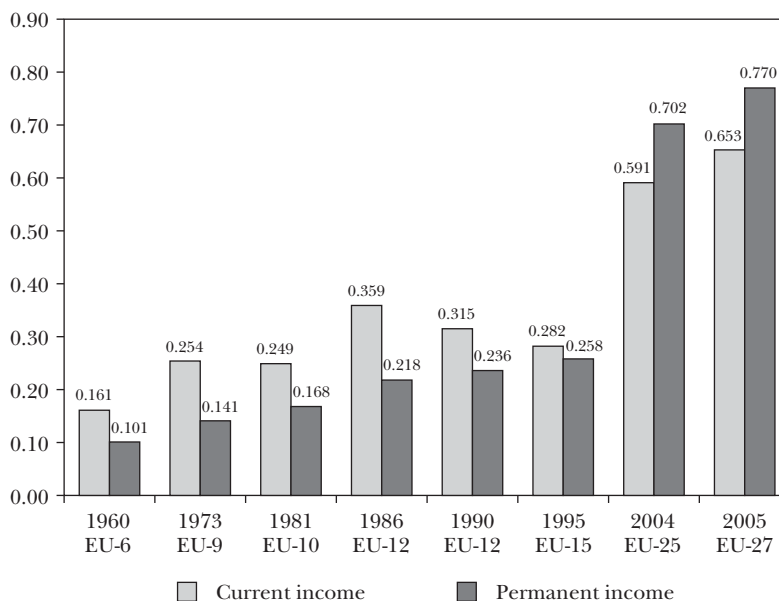
Our analysis of inequality in the EU will be based on the use of the coefficient of variation of per capita income, a common dispersion statistic in this type of inequality analysis. Graph 5.1 shows the level of inequality in different periods (including those years when expansions of the EU occur) for the countries forming the EU at that time, both in terms of current income and of permanent income. Let us first examine the results in terms of current income. The coefficient of variation of current income of the EU-6 is 0.161 in 1960. Following the entries in 1973 of Denmark, the United Kingdom and Ireland, the inequality increases to 0.254. In 1981, the year of Greece's entry, it is moderated to 0.249, growing substantially to 0.359 in 1986 (with the entries of Portugal and Spain). From then onwards there is a gradual descent to 0.315 in 1990 (reunification of Germany) and 0.282 in 2004 (expansion of the EU to 15). It must be said that the effect of the most recent expansions represents a very significant increase in inequality among EU members. In 2004 (with the expansion to 25 member countries) the coefficient reaches 0.591, and if we include Bulgaria and Romania (both of which joined the EU in 2007) the coefficient will be at levels around 0.653.

In sum, we observe a progressive increase in inequality until the mid-1980s, a reduction over the next 20 years and a sharp rise as a consequence of the latest expansions towards Eastern Europe. The current levels of

---

scenario, which is very high in both countries. Recent developments show a less extraordinary performance. Other scenarios estimated in the working paper allow for different hypotheses about future rates of growth.

**GRAPH 5.1: Inequality in per capita current income and permanent income in the EU countries**  
(deviation coefficient)



relative inequality, then, within this much more heterogeneous 27-member EU, multiply several times those existing among the original members of the European integration project.

Let us now consider inequality from a lifecycle perspective, using once again the coefficient of variation, but in this case that of permanent per capita income. The results are also in graph 5.1. The temporal profile now shows a continued growth which, indeed, accelerates quite visibly with the latest expansions. Thus the coefficient starts at a level of 0.101 in 1960 (EU-6), increases to 0.141 in 1973, 0.168 in 1981, 0.218 in 1986, 0.236 in 1990, 0.258 in 1995, 0.702 in 2004, and 0.770 in 2005. Also when permanent income is used, we observe that levels of inequality are at maximum values for the EU, much higher than the initial ones.

Comparing the results obtained from these two perspectives (current and permanent income), we observe some interesting differences. During the period prior to the latest expansion, inequality is much lower if permanent income is considered, especially for the years before 1995. That is to say, taking into account the future, and not only the income of the period, the levels of inequality within the EU are substantially less than those indicated by the current per capita income of the period. However after the lat-

est expansions taking place this century, the picture is quite the contrary. Inequality is greater in terms of permanent per capita income. The differences of life expectancy and of incomes foreseeable in the future tend to magnify the inequality among the members of the present EU, whereas in the past the opposite occurred. This means that, unless European cohesion policies contribute more actively to changing this panorama, the levels of inequality in the EU will continue to be high.

In this sense, it should be pointed out that the latest reforms of the EU's regional policy (European Commission, 2004), motivated to a large extent by the latest expansions with the entry of more heterogeneous countries, are moving in the direction of concentrating their actions on the unequivocally less developed areas. The aim of these reforms is to make the regional policy more effective in boosting the development of the less developed regions, essentially the majority of new member countries.

Once we have analyzed inequality and convergence in permanent income (scenario 1 or the historical scenario), our next step is to evaluate separately the role of each of their determining factors, such as survival rates, per capita current income and rate of convergence. To do so, we will isolate the effect of each one of them step by step, i.e., allowing for changes only in one of these variables each time. Such variables correspond to different assumptions about survival rates, the initial levels of per capita current income and the existence or not of convergence among countries in terms of per capita current income. On the basis of these scenarios, we simulate the inequality of permanent income of the countries by building some counterfactual scenarios. Particularly the following scenarios will be considered:

*Scenario 1 (historical base scenario):* This scenario considers that the per capita income of each economy in the initial period ( $y_{i0}$ ) grows at the individual average rate of growth ( $g_i$ ) during the 1960-2005 period. The series of per capita incomes ( $y_{it}$ ) obtained in this way [ $y_{it} = y_{i0} (1 + g_i)^t$ ] is used to calculate permanent income ( $PI_{i0}$ ) according to expression (5.1).

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, 0) = \sum_{t=0}^{120} \frac{y_{i0} (1 + g_i)^t}{(1+r)^t} S_i(t, 0). \quad (5.1)$$

*Scenario 2 (without convergence in current per capita income):* This scenario considers that the per capita income of each economy in the initial period ( $y_{i0}$ ) grows at the average rate of growth of the benchmark economy ( $g_{US}$ ) for the 1960-2005 period. The series of per capita incomes ( $y_{it}$ ) obtained in this way

$[y_{it} = y_{i0} (1 + g_{US})^t]$  is used to calculate permanent income ( $PI_{i0}$ ) according to expression (5.2).

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, 0) = \sum_{t=0}^{120} \frac{y_{i0} (1 + g_{US})^t}{(1+r)^t} S_i(t, 0). \quad (5.2)$$

*Scenario 3 (with identical survival rates):* This scenario is the same as scenario 1 with the sole exception that the per capita incomes of each economy ( $y_{it}$ ) obtained as described  $[y_{it} = y_{i0} (1 + g_i)^t]$  are combined with the survival rates of the benchmark economy ( $S_{US,t}$ ), obtaining the permanent income ( $PI_{i0}$ ) according to expression (5.3). This way we can evaluate the differences in permanent income that will persist even if the survival rates do not differ between economies.

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, 0) = \sum_{t=0}^{120} \frac{y_{i0} (1 + g_i)^t}{(1+r)^t} S_{US}(t, 0). \quad (5.3)$$

*Scenario 4 (with identical initial per capita incomes):* In this scenario, the per capita income of each economy in the initial period is considered equal to that of the benchmark economy ( $y_{i0} = g_{US0}$ ) and grows at the individual average rate of growth ( $g_i$ ) during the 1960-2005 period. The series of per capita incomes ( $y_{it}$ ) obtained in this way  $[y_{it} = y_{US0} (1 + g_i)^t]$  is used to calculate permanent income ( $PI_{i0}$ ) according to expression (5.4).

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, 0) = \sum_{t=0}^{120} \frac{y_{US0} (1 + g_i)^t}{(1+r)^t} S_i(t, 0). \quad (5.4)$$

*Scenario 5 (considers the rates of growth since integration):* This scenario considers that the per capita income of each economy in the initial period ( $y_{i0}$ ) grows at the individual average rate of growth ( $g_i^{POST}$ ) during the post-integration period to 2005. The series of per capita incomes ( $y_{it}$ ) obtained in this way  $[y_{it} = y_{i0} (1 + g_i^{POST})^t]$  is used to calculate permanent income ( $PI_{i0}$ ) according to expression (5.5).

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, 0) = \sum_{t=0}^{120} \frac{y_{i0} (1 + g_i^{POST})^t}{(1+r)^t} S_i(t, 0). \quad (5.5)$$

*Scenario 6 (with convergence in current per capita income):* This scenario considers that the per capita income of each economy in each period ( $y_{it}$ ) converges towards that of the benchmark economy ( $y_{US,t}$ ) at a speed of con-

vergence  $\beta$ . If we define the per capita income of an economy at moment  $t$ , relative to the benchmark economy, as  $\eta_t = y_{it}/y_{US,t}$ , and we further assume that there are no differences in steady state, then convergence at an annual rate of  $\beta$  makes  $\eta_t = [1 - e^{\beta t} (1 - \eta_0)]$  and  $y_{it} = y_{US,t} \cdot (1 - (1 - \eta_0) e^{-\beta t})$ . The series of per capita incomes ( $y_{it}$ ) obtained in this way is used to calculate permanent income ( $PI_{i0}$ ) according to expression (5.6). In this scenario, three rates of convergence are considered:  $\beta = 2\%$ ,  $\beta = 3\%$  and  $\beta = 5\%$ .

$$PI_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t, 0) = \sum_{t=0}^{120} \frac{y_{US,t} \cdot (1 - (1 - \eta_0) e^{-\beta t})}{(1+r)^t} S_i(t, 0). \quad (5.6)$$

Table 5.2 shows the coefficients of variation of permanent per capita income corresponding to these new counterfactual scenarios.

**TABLE 5.2: Inequality in current income and permanent income in the EU countries. Different scenarios**  
(deviation coefficient)

		Current income	Permanent income (scenarios)							
			Scen. 1	Scen. 2 ( $g_{USA}$ )	Scen. 3 ( $S_{USA}$ )	Scen. 4 ( $Ypc_{USA}$ )	Scen. 5 ( $g_{post}$ )	Scen. 6 ( $\beta = 2\%$ )	Scen. 6 ( $\beta = 3\%$ )	Scen. 6 ( $\beta = 5\%$ )
1960	EU-6	0.161	0.101	0.175	0.089	0.075	0.101	0.075	0.060	0.045
1973	EU-9	0.254	0.141	0.263	0.140	0.360	0.241	0.112	0.085	0.058
1981	EU-10	0.249	0.168	0.251	0.182	0.338	0.440	0.099	0.074	0.048
1986	EU-12	0.359	0.218	0.358	0.228	0.313	0.772	0.129	0.093	0.059
1990	EU-12	0.315	0.236	0.313	0.248	0.312	0.851	0.115	0.083	0.053
1995	EU-15	0.282	0.258	0.281	0.267	0.294	1.078	0.106	0.077	0.049
2004	EU-25	0.591	0.702	0.603	0.695	0.507	2.699	0.209	0.157	0.109
2005	EU-27	0.653	0.770	0.667	0.761	0.499	2.850	0.223	0.167	0.116

As we show above, one of the potentially important factors in determining permanent income is the future rate of growth of current per capita income. To estimate its impact on inequality, we define scenario 2. In it we obtain the permanent incomes of each country on the assumption of a common future growth rate. Specifically the growth rate of per capita income of the U.S. from 1960 to the present is used for all countries. The initial levels of per capita income and life expectancies, on the other hand, continue to be those of each country. The results of scenario 2 show increasing inequalities until the creation of the EU-12, followed by slight reductions in the 1990s and a sharp rise triggered by the latest expansions. Of more interest is the comparison between these results and those of scenario 1, as



the differences between the two indicate the part of the inequality in permanent income associated with the different, long-term growth rates of the current per capita income of each country. As it can be observed, the different rates of growth of per capita income during the 1960-2005 period help to reduce inequality, with the exception of 1960 and 2005. In the successive expansions from 1973 to 1995, we can observe that the inequality in permanent income of the historical scenario (scenario 1) is always less than that which would be obtained with a common rate of growth. Thus in 1986 the coefficient of variation of the EU-12 countries is 0.218, but applying the common growth rate (scenario 2) this coefficient would be 0.313, indicating nearly 50% more inequality in permanent income. The reason is that, when the member countries of the EU-9, EU-10, EU-12 and EU-15 are considered as a whole, the countries with the lowest per capita income showed faster long-term growth during the 1960-2005 period. However the latest expansions again show differential characteristics. For the EU-25 inequality stands at 0.702 and for the EU-27 at 0.77, according to scenario 1. Using a common growth rate, the inequality falls to 0.603 and 0.667, respectively. This is because the latest expansions bring in countries that are less developed and which in the past have shown less capacity for long-term growth.

The second important factor for explaining inequality among countries is the difference in life expectancy. Scenario 3 is defined for the purpose of evaluating the importance that differences in life expectancy have had for the levels of inequality among the countries of the EU throughout its history. The results of this scenario are obtained under the assumption that all the countries have a common life expectancy, specifically that of the U.S. Therefore the differences between the inequality levels of this scenario 3 and those of scenario 1 (historical scenario) have to be attributed to the differences in life expectancy of each country. Thus in 1960 the differences in life expectancy among the member countries of the EU-6 explain a significant part of the inequality in permanent income (with a common life expectancy like that of the U.S., the coefficient of variation of permanent income would be 0.089 instead of 0.101). On the other hand during the 80s and 90s the effect is the opposite, helping to reduce slightly the inequality in permanent income (thus in 1995 the coefficient of variation among the countries of the EU-15 with a common life expectancy would have been 0.267 instead of 0.258). The impact of life expectancy is currently very low, and the levels of inequality will barely change even though the differences in life expectancy disappear.

Scenario 4 corresponds to the estimations of permanent income obtained by assuming that all the EU countries start with the same initial per capita income, while maintaining the life expectancies and long-term growth rates of each country. In 1960 there is an inequality of permanent income of 0.075, clearly below the inequality in current per capita income and also below the inequality observed in the historical scenario (scenario 1). This confirms that differences in life expectancy and, particularly, in growth rates, were contributing significantly to the inequality among the member countries of the original EU. From that moment onwards, the impact of these two factors becomes more and more substantial. Inequality in permanent income is greater than those obtained in scenario 1 in 1973, 1981, 1986 and 1995. With the latest expansion, this trend is broken since most of the new member countries present a substantial gap between their initial current per capita incomes and those of the existing member countries. The impact of growth rates and of differences in life expectancy is substantial (thus the inequality in scenario 4 rises from 0.294 for the EU-15 in 1995 to 0.507 for the EU-25 in 2004), but the differences are smaller than in scenario 1 (thus in 2004 for the EU-25 inequality in permanent income is 0.507 in scenario 4 and 0.702 in scenario 1).

The evidence for the growth trajectories of the European countries after each expansion are not specially encouraging. The results of scenario 5 are obtained by estimating the future current incomes for each year on the basis of the growth rates experienced by each country since that year. Let us recall that the estimations of scenario 1 are always based on the growth rates measured from 1960 to the present. The comparison between scenario 5 and scenario 1 is clear. We can leave aside the result for 1960 which, naturally, has to coincide. For the rest of the years, the inequality estimated in permanent income is significantly greater because post-expansion growths are used. This already occurs in 1973 (0.241 and 0.141), and the phenomenon persists with increasing intensity. In 1995 the level of inequality will be multiplied by four (1.078 and 0.258), and with the latest expansion the result is similar (2.85 and 0.77). Naturally we have to bear in mind that the more recent the year analyzed, the shorter the period that serves to calculate the growth rates, which may be specially subject to immediate factors and not so much to long-term ones. In sum, the results indicate that if the current post-integration growth rates are maintained, substantial levels of inequality will remain.

Let us recall that the base estimation (scenario 1) is obtained from the rates of growth of per capita long-term income (1960-2005) of each country in the past. A different pattern of growth in the future can have a

substantial impact. In scenario 6 these growth rates are replaced by others that correspond to a situation of convergence in per capita current incomes among the countries of Europe. Under this hypothesis, the countries with the lowest per capita income will grow most and will do so faster due to their relative backwardness. Three different annual convergence rates are posited: 2, 3 and 5%. These three convergence scenarios correspond to the hypothesis that each country manages to reduce the gap in current per capita income by 2, 3 or 5% (respectively) each year.

The results indicate a steep reduction of inequality in permanent income among countries of the EU. The results of scenario 1 indicate that the inequality in permanent income in the EU is currently 0.77. However instead of maintaining the past growth rates of each country, if we assume that in the future there will be an annual convergence of 2%, the estimated inequality in permanent income will currently be only 0.223, less than one third. If a somewhat greater annual convergence in current per capita income (3%) is achieved, it will be only 0.167. Finally with a convergence rate of 5%, the inequality in permanent income will be barely 0.116.

In other words, if thanks to the process of economic integration itself or to the EU's cohesion policies a convergence rate of 2% is achieved, the inequality in current income in 2005 of 0.653 will be compatible with a lifecycle inequality two-thirds lower (0.223).

It should be emphasized that rates of convergence between economies of 2% are perfectly feasible. Numerous studies estimate similar convergence rates among the countries of the Organisation for Economic Co-operation and Development (OECD), the states of the U.S., the prefectures of Japan, the regions of Germany, Spain, etc. (Barro and Sala-i-Martin, 1995). Furthermore any increase in that rate of convergence will have its reward in an appreciable reduction of the inequality in permanent income.

After analyzing the influence of the determinants of permanent income on inequality, we may wonder about the evolution of inequality following the successive expansions, both for *old* member countries, and for the countries that are joining the EU. Table 5.3 permits us to observe the phenomenon of inequality in this multiple dimension, both in terms of current per capita income (panel a) and in terms of permanent per capita income under scenario 1 (panel b).

The rows of the upper panel let us see the evolution of inequality in current per capita income of the successive groups of countries that have come to form the EU throughout the 1960-2005 period. In the first row, we

**TABLE 5.3: Inequality in current income and permanent income in the EU countries**  
(deviation coefficient)

a) Per capita income								
	1960	1973	1981	1986	1990	1995	2004	2005
EU-6 (1951)	0.161	0.110	0.084	0.086	0.079	0.078	0.082	0.085
EU-9 (1973)	0.292	0.254	0.196	0.222	0.168	0.151	0.143	0.152
EU-10 (1981)	0.371	0.291	0.249	0.282	0.252	0.250	0.232	0.235
EU-12 (1986)	0.469	0.353	0.329	0.359	0.317	0.316	0.306	0.309
EU-12 (1990)	0.466	0.353	0.327	0.357	0.315	0.315	0.306	0.309
EU-15 (1995)	0.420	0.320	0.299	0.324	0.289	0.282	0.274	0.278
EU-25 (2004)	0.670	0.636	0.597	0.608	0.596	0.631	0.591	0.583
EU-27 (2007)	0.735	0.702	0.661	0.671	0.663	0.699	0.661	0.653
b) Permanent income								
	1960	1973	1981	1986	1990	1995	2004	2005
EU-6 (1951)	0.101	0.068	0.058	0.060	0.064	0.058	0.073	0.074
EU-9 (1973)	0.170	0.141	0.143	0.136	0.182	0.251	0.490	0.500
EU-10 (1981)	0.252	0.158	0.168	0.176	0.222	0.289	0.501	0.509
EU-12 (1986)	0.336	0.199	0.210	0.218	0.236	0.294	0.490	0.499
EU-12 (1990)	0.336	0.199	0.210	0.218	0.236	0.294	0.491	0.498
EU-15 (1995)	0.302	0.187	0.198	0.209	0.218	0.258	0.424	0.430
EU-25 (2004)	0.596	0.567	0.553	0.556	0.577	0.644	0.702	0.699
EU-27 (2007)	0.666	0.640	0.624	0.626	0.650	0.717	0.773	0.770

can observe that the inequality among the founding countries at the start of the EU (EU-6) decreases progressively from 0.161 to less than half of that in 1995 (0.078), rising slightly thereafter (0.085 in 2005), though remaining well below the initial levels. For the expanded group of countries that formed the EU-9 in 1973 something similar occurs, with inequality decreasing from 0.254 in 1973 to 0.152 in 2005. With the entry of Greece in 1981, the EU-10 is formed, and the reduction of inequality for this group is weaker (from 0.249 in 1981 to 0.235 in 2005). More positive is the experience of the EU-12 with the entries of Spain and Portugal in 1986: inequality is reduced from a level of 0.359 in that year to 0.309 in 2005. Slight reductions are also observed for the expanded collectives EU-15 and EU-25 as from their respective creations. That is to say that the general trend is that the successive expansions are accompanied by reductions in the inequality among the *old* members.

Analysis of the table columns indicates that the inequality for the total of the EU countries will increase as a consequence of the entries of new, more heterogeneous countries. Thus observing the levels of inequality in current per capita income in 2005 for the different subgroups (last column), we observe that it increases with the subgroup considered: 0.085 for the EU-6, 0.152 for the EU-9, 0.235 for the EU-10, 0.309 for the EU-12, 0.278 for the EU-15 (this is the only exception, which is reasonable given the characteristics of the three new members), steep rise to 0.583 for the EU-25, and 0.653 for the EU-27 countries.

The lower panel shows the results in terms of permanent per capita income. There are many similarities, but also some significant differences from the estimates in terms of current per capita income. Thus observing the level of inequality in 2005, we can see that the various expansions mean a clear increase in inequality for the EU, from the level of 0.074 for the founding countries (EU-6) to levels of around 0.50 for the EU-9, EU-10 and EU-12 and, finally, levels of 0.699 for the EU-25 and 0.77 for the EU-27. No increase in inequality is observed for 2005, when the EU-9 expanded to EU-10 or EU-12, something which does happen when current income is examined.

If we now focus our attention on the impact of the successive expansions over time, we will see that only in the case of the founding countries (EU-6) do we observe a reduction of inequality in permanent income: the coefficient of inequality goes from 0.101 in 1960 to 0.074 in 2005. For the rest of the groupings that forms the EU at each time, the trend is the opposite: the EU-9 countries go from 0.141 in 1973 to 0.500 in 2005; the EU-10 countries from 0.168 in 1981 to 0.509 in 2005; the EU-12 countries from 0.218 in 1986 to 0.499 in 2005; and the EU-15 countries from 0.258 in 1995 to 0.430 in 2005. The general trend is that the successive expansions are accompanied by substantial increases in inequality of permanent incomes among the *old* members, except in the case of the 6 founding countries.

## 6. Conclusions

ONE of the basic objectives of the European integration process is that the potential positive effects deriving from it should economically benefit all the member countries. In particular, the European Union's regional policy devotes a substantial part of the resources of the Union's budget for the purpose of reducing the economic inequalities in the territorial sphere.

The usual analyses of inequality focus on the evolution of the current per capita income of the period. Thus when a fixed group of countries is analyzed over time (i.e., that formed by the 6 initial member countries or any of the groups that have come to form the area, EU-9, EU-12, EU-15, etc.), a trend towards convergence in current per capita income can be appreciated between 1960 and 2005. When the analysis focuses on the changing group of countries that have formed the European Union over time, what we observe is an increasing level of inequality until the 1986 expansion, followed by an intense convergence until the latest expansions from 2004 onwards. On the other hand, the latest incorporations have led to the European Union having the highest levels of inequality among member countries of its entire history.

In this study, to analyze the problem of inequality and convergence among the European Union (EU) countries, we adopt a complementary approach to the usual one. This approach is connected with the permanent income and life-cycle theories. The main issue with these theories is the fact that they consider the complete flow of discounted future incomes. Regarding inequality, the results obtained with this permanent income approach may differ from those obtained when only the differences in current income are considered. The reason is that this approach takes into account the fact that countries may grow at different rates, which will determine the future incomes of their inhabitants. Moreover if individuals do not have the same survival rates in different countries, the number of years during which the incomes are generated will be different. Such difference will also affect the present value of the total sum of incomes that individuals will obtain throughout their lives.

The results obtained indicate that inequality in terms of permanent income is substantially less than that shown by current per capita income for the European Union up until its most recent processes of expansion. How-

ever the opposite occurs during the expansions of the last decade. The inequality in current income currently underestimates the inequality in permanent income, a somewhat unsatisfactory situation.

Nor does the temporal evolution of inequality in permanent income permit us to be too optimistic. Focussing the analysis on the fixed groups of countries that have formed the different European Unions, we observe convergence until the mid-1980s and divergence from then onwards. On the other hand, the behavior of the changing group of countries that have formed the European Union in the course of time shows an almost permanent tendency towards divergence.

Differences in life expectancy would have helped to increase inequality in permanent income in the initial phases of the European integration project. However at present they have very little impact. The overall level of inequality would now be practically the same even if all the countries had the same life expectancy.

The differences in the starting level of per capita current incomes are a more important factor of inequality in permanent income, though the sign of their effect varies in the course of the period analyzed. In the 1960s and also at the present time they contribute substantially to generating greater inequality in permanent income.

Finally we should point out the influence of the different economic growth rates of each country. This factor would have clearly contributed to reducing inequality in permanent income systematically since 1960. However with the latest expansion its effect has been inverted, and it has become a source of greater inequality in permanent income.

The analysis of the effects of the expansions on the different groups of countries indicates that the successive expansions are accompanied by substantial increases of inequality in permanent income among the *old* members, except with regard to the case of the 6 founding countries.

All these results point to the key role of economic growth in achieving further reductions in inequality in the EU since contribution of other variables such as life expectancy seems, at present, to be rather limited. Policies that stimulate greater growth of the less developed countries should have considerable effect. The simulations carried out here show that with an annual convergence rate of 2% (i.e., countries reduce the gap existing in current per capita income by 2% every year), the inequality in permanent income will be less than one third of what it is now. This rate of convergence is ambitious, but not impossible, as it is consistent with that recorded by the countries of the Organisation for Economic Co-operation and Development (OECD) in the past, and with those habitually obtained when analyzing convergence among the regions of a single country.

## Appendix: Construction of Survival Rates

THE survival rates for each age are not available for a large number of countries. In this study to calculate them we use the same procedure as in Becker, Philipson and Soares (2001), based on the data offered by *World Bank Development Indicators (WDI) 2006*. The procedure is based on four types of information available relating to survival rates <sup>7</sup>: infant mortality <sup>8</sup> in the first year ( $S(1, 0)$ ), infant mortality in the first five years <sup>9</sup> ( $S(5, 0)$ ), the survival rate at 60 years <sup>10</sup> conditional on reaching 15 ( $S(60, 15)$ ), and life expectancy at birth (total years) ( $E_0$ ). Using this information, together with some simplifying assumptions, it is possible to construct the survival rates of 89 countries considered in the study for ages between 1 and 120 years.

By definition we have the following relationships between the rates of survival:

$$S(5, 1) = \frac{S(5,0)}{S(1, 0)} \text{ and } E_{60} = \sum_{t=61}^{\infty} S(t, 60) = \frac{E_0 - \sum_{t=0}^{60} S(t, 0)}{S(60, 0)},$$

where  $E_{60}$  are the additional years of life for a 60 year-old individual.

The assumptions made with regard to the rates of survival are as follows:

$$\begin{aligned} S(t, t-1) &= S(t+1, t), & \text{for } 2 \leq t \leq 4; \\ S(t, t-1) &= 1, & \text{for } 6 \leq t \leq 15; \end{aligned}$$

---

7. The information provided by the WDI is presented as number of deaths ( $n_{ij}$ ) per 1,000 individuals, so it had to be converted to rates  $S(i, j)$  using the following formula:

$$S(i, j) = \frac{1,000 - n(i, j)}{1,000}.$$

8. Mortality rate, infant (per 1,000 live births).

9. Mortality rate, under-5 (per 1,000 live births).

10. Mortality rate, adult (per 1,000 adults). The information from the World Bank captures the mortality rate separately for men and women. In this study we consider the average.



$$\begin{aligned} S(t, t-1) &= S(t+1, t), & \text{for } 16 \leq t \leq 59; \\ S(t, 60) &= e^{-(t60)}, & \text{for } 60 \leq t \leq 120; \\ S(t+1, t) &= 0, & \text{for } t > 120. \end{aligned}$$

Given the information available, it is sufficient to reconstruct all the distribution of survival. This is done as follows:

$$\begin{aligned} S(t, t-1) &= \sqrt[4]{S(5, 1)}, & \text{for } 2 \leq t \leq 4; \\ S(t, t-1) &= 1, & \text{for } 6 \leq t \leq 15; \\ S(t, t-1) &= \sqrt[45]{S(60, 15)}, & \text{for } 16 \leq t \leq 59; \\ S(t, t-1) &= \frac{S(t+1, 60)}{S(t, 60)}, & \text{for } 60 \leq t \leq 120; \\ S(t+1, t) &= 0, & \text{for } t > 120, \end{aligned}$$

where  $S(t, 60)$  for  $t > 60$  is obtained from  $S(t, 60) = e^{-\beta(t60)}$  and  $\beta = \frac{1}{E_{60}}$  (from the integration of  $S(t, 60)$  of 60 to  $\infty$ ).

The assumptions adopted are not very far from reality, and permit us to use the full potential of the available information.

# References

- ABIAD, A. G., D. LEIGH and A. MODY (2007): "International Finance and Income Convergence: Europe is Different", *International Monetary Fund (IMF)*, Working Paper 64.
- BARRO, R. J. and X. SALA-I-MARTIN (1992): "Convergence", *Journal of Political Economy* (100), 223-251.
- and X. SALA-I-MARTIN (1995): *Economic Growth*, NY, Mc Graw-Hill.
- BECKER, G., T. J. PHILIPSON and R. SOARES (2001): "Growth and Mortality in Less Developed Nations", Unpublished manuscript, University of Chicago.
- T. J. PHILIPSON and R. SOARES (2005): "The Quantity and Quality of Life and the Evolution of World Inequality", *American Economic Review*, 95 (1), 277-291.
- CAPPELEN, A., F. CASTELLACCI, J. FAGGERBERG and B. VERSPAGEN (2003): "The Impact of EU Regional Support on Growth and Convergence in the European Union", *Journal of Common Market Studies*, 41 (09), 621-644.
- CAVES, R. E. and D. R. BARTON (1990): *Efficiency in U.S. Manufacturing Industries*, MIT Press Cambridge, Mass.
- DELGADO-RODRÍGUEZ, M. J. and I. ÁLVAREZ-AYUSO (2008): "Economic Growth and Convergence of EU-Member Status: An Empirical Investigation", *Review of Development Economics*, 12 (3), 486-497.
- DOWRICK, S., Y. DUNLOP and J. QUIGGIN (2003): "Social Indicators and Comparisons of Living Standards", *Journal of Development Economics*, 70 (2), 501-529.
- ERTUR, C. and W. KOCH (2006): "Regional Disparities in the European Union and the Enlargement Process: An Exploratory Spatial Data Analysis, 1995-2000", *The Annals of Regional Science*, 40 (4), 723-765.
- EUROPEAN COMMISSION (2004): "A New Partnership for Cohesion Convergence Competitiveness Cooperation", *Third Report on Economic and Social Cohesion*.
- FRANCOIS, J. F., B. McDONALD and H. NORDSTRÖM (1994): *The Uruguay Round: A Global General Equilibrium Assessment*, Centre for Economic Policy Research (CEPR), Discussion Paper 1067.
- FRIEDMAN, M. (1957): *A Theory of the Consumption Function*, 4th print ed., Princeton University Press, Princeton NJ.
- GASIOREK, M., A. SMITH and A. VENABLES (1992): "Trade and Welfare: A General Equilibrium Model", in *Trade Flows and Trade Policy after 1992*, Cambridge University Press, 35-63.
- GULDAGER, P. (1997): "Convergence of the EU Member States Towards the EMU Requirements, 1986 to 1993", *European Journal of Political Economy*, 13 (2), 247-259.

- HARRIS, R. (1984): "Applied General Equilibrium Analysis of Small Open Economies with Scale Economies and Imperfect Competition", *The American Economic Review*, 74 (5), 1016-1032.
- HENREKSON, M., J. TORSTENSSON and R. TORSTENSSON (1997): "Growth Effects of European Integration", *European Economic Review* (41), 1527-1557.
- KAITILA, V. (2004): "Convergence of Real GDP Per Capita in the EU-15: How Do the Accession Countries Fit in", *European Network of Economic Policy Research Institutes*, Working Paper 25, 1-34.
- LEE, J. W. (1992): "International Trade, Distortions, and Long-Run Economic Growth", International Monetary Fund, Research Department.
- MACDONALD, J. M. (1994): "Does Import Competition Force Efficient Production?", *Review of Economics and Statistics*, 76 (4), 721-727.
- MAUDOS, J., J. M. PASTOR and L. SERRANO (1999): "Economic Integration, Efficiency and Economic Growth: The European Union Experience", *Applied Economics Letters*, 6 (6), 389-392.
- MODIGLIANI, F. (1986): "Life Cycle, Individual Thrift, and the Wealth of Nations", *American Economic Review* (76), 297-313.
- and R. BRUMBERG (1954): "Utility Analysis and the Consumption Function: An Interpretation of Cross-Section Data", *Post-Keynesian Economics* (388), 436.
- PASTOR, J. M. and L. SERRANO (2008): "Permanent Income, Convergence and Inequality Among Countries", *Review of Income and Wealth*, 54 (1), 105-115.
- PHILIPSON, T. J. and R. SOARES (2001): "Human Capital, Longevity, and Economic Growth: A Quantitative Assessment of Full Income Measures", Manuscript.
- QUAH, D. T. (1996): "Regional Convergence Clusters Across Europe", *European Economic Review*, 40 (3-5), 951-958.
- REZA, R. and K. T. ZAHRA (2008): "Evaluation of the Income Convergence Hypothesis in Ten New Members of the European Union. A Panel Unit Root Approach", *Panoeconomicus* (2), 157-166.
- SERRANO, L. (2006): "Convergencia y desigualdad en renta permanente y corriente. Factores determinantes", BBVA Foundation, Working Paper 1-33.
- SCHULTZ, T. P. (1998): "Inequality in the Distribution of Personal Income in the World: How it Is Changing and Why", *Journal of Population Economics* (11), 307-344.
- STOCKHAMMER, E. (2009): "Effects of European Integration on Austria's Economy", *International Review of Applied Economics*, 23 (1), 19-40.
- VINER, J. (1950): *The Customs Union Issue*, New York.

## *A B O U T   T H E   A U T H O R S \**

**LORENZO SERRANO MARTÍNEZ** holds a PhD in economics from the University of Valencia. He also completed a degree in monetary economics at the Centre of Financial and Monetary Studies in Madrid. His research interests are economic growth, human capital and regional economics. He has been a research fellow in the SOM Research School of the University of Groningen, and is currently a professor of economic analysis at the University of Valencia and a research professor in the Valencian Economic Research Institute (Ivie).  
E-mail: [lorenzo.serrano@ivie.es](mailto:lorenzo.serrano@ivie.es)

**JOSÉ MANUEL PASTOR MONSÁLVEZ** holds a PhD in economics from the University of Valencia (1996) where he is currently a professor. He has received scholarships from several institutions (Valencian Regional Government, Fundación Caja Madrid, FIES). He has been a visiting scholar at Florida State University (1996-1997) and an external consultant of the World Bank. His research interests include banking and regional economics. He has co-authored several books and has published more than thirty articles in academic journals.  
E-mail: [jose.m.pastor@uv.es](mailto:jose.m.pastor@uv.es)

---

Any comments on the contents of this paper can be addressed to José Manuel Pastor Monsálvez at [jose.m.pastor@uv.es](mailto:jose.m.pastor@uv.es).

\* The authors wish to thank the Spanish Science and Education Ministry-European Regional Development Fund (ERDF) (SEC2008-03813/ECON) for their financial support.



# Fundación **BBVA**

## DOCUMENTOS DE TRABAJO

### NÚMEROS PUBLICADOS

- DT 01/02 *Trampa del desempleo y educación: un análisis de las relaciones entre los efectos desincentivadores de las prestaciones en el Estado del Bienestar y la educación*  
Jorge Calero Martínez y Mónica Madrigal Bajo
- DT 02/02 *Un instrumento de contratación externa: los vales o cheques. Análisis teórico y evidencias empíricas*  
Ivan Planas Miret
- DT 03/02 *Financiación capítativa, articulación entre niveles asistenciales y descentralización de las organizaciones sanitarias*  
Vicente Ortún-Rubio y Guillem López-Casasnovas
- DT 04/02 *La reforma del IRPF y los determinantes de la oferta laboral en la familia española*  
Santiago Álvarez García y Juan Prieto Rodríguez
- DT 05/02 *The Use of Correspondence Analysis in the Exploration of Health Survey Data*  
Michael Greenacre
- DT 01/03 *¿Quiénes se beneficiaron de la reforma del IRPF de 1999?*  
José Manuel González-Páramo y José Félix Sanz Sanz
- DT 02/03 *La imagen ciudadana de la Justicia*  
José Juan Toharia Cortés
- DT 03/03 *Para medir la calidad de la Justicia (I): Abogados*  
Juan José García de la Cruz Herrero
- DT 04/03 *Para medir la calidad de la Justicia (II): Procuradores*  
Juan José García de la Cruz Herrero
- DT 05/03 *Dilación, eficiencia y costes: ¿Cómo ayudar a que la imagen de la Justicia se corresponda mejor con la realidad?*  
Santos Pastor Prieto
- DT 06/03 *Integración vertical y contratación externa en los servicios generales de los hospitales españoles*  
Jaume Puig-Junoy y Pol Pérez Sust
- DT 07/03 *Gasto sanitario y envejecimiento de la población en España*  
Namkee Ahn, Javier Alonso Meseguer y José A. Herce San Miguel

- DT 01/04 *Métodos de solución de problemas de asignación de recursos sanitarios*  
Helena Ramalhinho Dias Lourenço y Daniel Serra de la Figuera
- DT 01/05 *Licensing of University Inventions: The Role of a Technology Transfer Office*  
Inés Macho-Stadler, David Pérez-Castrillo y Reinhilde Veugelers
- DT 02/05 *Estimating the Intensity of Price and Non-price Competition in Banking: An Application to the Spanish Case*  
Santiago Carbó Valverde, Juan Fernández de Guevara Radoselovics, David Humphrey y Joaquín Maudos Villarroya
- DT 03/05 *Sistemas de pensiones y fecundidad. Un enfoque de generaciones solapadas*  
Gemma Abío Roig y Concepció Patxot Cardoner
- DT 04/05 *Análisis de los factores de exclusión social*  
Joan Subirats i Humet (Dir.), Ricard Gomà Carmona y Joaquim Brugué Torruella (Coords.)
- DT 05/05 *Riesgos de exclusión social en las Comunidades Autónomas*  
Joan Subirats i Humet (Dir.), Ricard Gomà Carmona y Joaquim Brugué Torruella (Coords.)
- DT 06/05 *A Dynamic Stochastic Approach to Fisheries Management Assessment: An Application to some European Fisheries*  
José M. Da-Rocha Álvarez y María-José Gutiérrez Huerta
- DT 07/05 *The New Keynesian Monetary Model: Does it Show the Comovement between Output and Inflation in the U.S. and the Euro Area?*  
Ramón María-Dolores Pedrero y Jesús Vázquez Pérez
- DT 08/05 *The Relationship between Risk and Expected Return in Europe*  
Ángel León Valle, Juan Nave Pineda y Gonzalo Rubio Irigoyen
- DT 09/05 *License Allocation and Performance in Telecommunications Markets*  
Roberto Burguet Verde
- DT 10/05 *Procurement with Downward Sloping Demand: More Simple Economics*  
Roberto Burguet Verde
- DT 11/05 *Technological and Physical Obsolescence and the Timing of Adoption*  
Ramón Caminal Echevarría
- DT 01/06 *El efecto de la inmigración en las oportunidades de empleo de los trabajadores nacionales: Evidencia para España*  
Raquel Carrasco Perea, Juan Francisco Jimeno Serrano y Ana Carolina Ortega Masagué
- DT 02/06 *Inmigración y pensiones: ¿Qué sabemos?*  
José Ignacio Conde-Ruiz, Juan Francisco Jimeno Serrano y Guadalupe Valera Blanes
- DT 03/06 *A Survey Study of Factors Influencing Risk Taking Behavior in Real World Decisions under Uncertainty*  
Manel Baucells Alibés y Cristina Rata
- DT 04/06 *Measurement of Social Capital and Growth: An Economic Methodology*  
Francisco Pérez García, Lorenzo Serrano Martínez, Vicente Montesinos Santalucía y Juan Fernández de Guevara Radoselovics

- DT 05/06 *The Role of ICT in the Spanish Productivity Slowdown*  
Matilde Mas Ivars y Javier Quesada Ibáñez
- DT 06/06 *Cross-Country Comparisons of Competition and Pricing Power in European Banking*  
David Humphrey, Santiago Carbó Valverde, Joaquín Maudos Villarroya y Philip Molyneux
- DT 07/06 *The Design of Syndicates in Venture Capital*  
Giacinta Cestone, Josh Lerner y Lucy White
- DT 08/06 *Efectos de la confianza en la información contable sobre el coste de la deuda*  
Belén Gill de Albornoz Noguer y Manuel Illueca Muñoz
- DT 09/06 *Relaciones sociales y envejecimiento saludable*  
Ángel Otero Puime, María Victoria Zunzunegui Pastor, François Béland, Ángel Rodríguez Laso y María Jesús García de Yébenes y Prous
- DT 10/06 *Ciclo económico y convergencia real en la Unión Europea: Análisis de los PIB per cápita en la UE-15*  
José Luis Cendejas Bueno, Juan Luis del Hoyo Bernat, Jesús Guillermo Llorente Álvarez, Manuel Monjas Barroso y Carlos Rivero Rodríguez
- DT 11/06 *Esperanza de vida en España a lo largo del siglo xx: Las tablas de mortalidad del Instituto Nacional de Estadística*  
Francisco José Goerlich Gisbert y Rafael Pinilla Pallejà
- DT 12/06 *Convergencia y desigualdad en renta permanente y corriente: Factores determinantes*  
Lorenzo Serrano Martínez
- DT 13/06 *The Common Agricultural Policy and Farming in Protected Ecosystems: A Policy Analysis Matrix Approach*  
Ernest Reig Martínez y Vicent Estruch Guitart
- DT 14/06 *Infrastructures and New Technologies as Sources of Spanish Economic Growth*  
Matilde Mas Ivars
- DT 15/06 *Cumulative Dominance and Heuristic Performance in Binary Multi-Attribute Choice*  
Manel Baucells Alibés, Juan Antonio Carrasco López y Robin M. Hogarth
- DT 16/06 *Dynamic Mixed Duopoly: A Model Motivated by Linux versus Windows*  
Ramon Casadesus-Masanell y Pankaj Ghemawat
- DT 01/07 *Social Preferences, Skill Segregation and Wage Dynamics*  
Antonio Cabrales Goitia, Antoni Calvo-Armengol y Nicola Pavoni
- DT 02/07 *Stochastic Dominance and Cumulative Prospect Theory*  
Manel Baucells Alibés y Franz H. Heukamp
- DT 03/07 *Agency Revisited*  
Ramon Casadesus-Masanell y Daniel F. Spulber
- DT 04/07 *Social Capital and Bank Performance: An International Comparison for OECD Countries*  
José Manuel Pastor Monsálvez y Emili Tortosa-Ausina



- DT 05/07 *Cooperation and Cultural Transmission in a Coordination Game*  
Gonzalo Olcina Vauteren y Vicente Calabuig Alcántara
- DT 06/07 *The Extended Atkinson Family and Changes in Expenditure Distribution: Spain 1973/74 – 2003*  
Francisco J. Goerlich Gisbert, María Casilda Lasso de la Vega Martínez y Ana Marta Urrutia Careaga
- DT 07/07 *Análisis de la evolución de la dependencia en la tercera edad en España*  
David Casado Marín
- DT 08/07 *Designing Contracts for University Spin-offs*  
Inés Macho-Stadler, David Pérez-Castrillo y Reinhilde Veugelers
- DT 09/07 *Regional Differences in Socioeconomic Health Inequalities in Spain*  
Pilar García Gómez y Ángel López Nicolás
- DT 10/07 *The Evolution of Inequity in Access to Health Care in Spain: 1987-2001*  
Pilar García Gómez y Ángel López Nicolás
- DT 11/07 *The Economics of Credit Cards, Debit Cards and ATMs: A Survey and Some New Evidence*  
Santiago Carbó-Valverde, Nadia Massoud, Francisco Rodríguez-Fernández, Anthony Saunders y Barry Scholnick
- DT 12/07 *El impacto comercial de la integración europea, 1950-2000*  
Luis Fernando Lanaspá Santolaria, Antonio Montañés Bernal, Marcos Sanso Frago y Fernando Sanz Gracia
- DT 13/07 *Proyecciones de demanda de educación en España*  
Andrés M. Alonso Fernández, Daniel Peña Sánchez de Rivera y Julio Rodríguez Puerta
- DT 14/07 *Aversion to Inequality and Segregating Equilibria*  
Antonio Cabrales Goitia y Antoni Calvó-Armengol
- DT 15/07 *Corporate Downsizing to Rebuild Team Spirit*  
Antonio Cabrales Goitia y Antoni Calvó-Armengol
- DT 16/07 *Maternidad sin matrimonio: Nueva vía de formación de familias en España*  
Teresa Castro Martín
- DT 17/07 *Immigrant Mothers, Spanish Babies: Childbearing Patterns of Foreign Women in Spain*  
Marta Roig Vila y Teresa Castro Martín
- DT 18/07 *Los procesos de convergencia financiera en Europa y su relación con el ciclo económico*  
José Luis Cendejas Bueno, Juan Luis del Hoyo Bernat, Jesús Guillermo Llorente Álvarez, Manuel Monjas Barroso y Carlos Rivero Rodríguez
- DT 19/07 *On Capturing Rent from a Non-Renewable Resource International Monopoly: A Dynamic Game Approach*  
Santiago J. Rubio Jorge

- DT 20/07 *Simulación de políticas impositivas medioambientales:  
Un modelo de equilibrio general de la economía española*  
Antonio Manresa Sánchez y Ferran Sancho Pifarré
- DT 21/07 *Causas del crecimiento económico en Argentina (1990-2004):  
Otro caso de «tiranía de los números»*  
Ariel Alberto Coremberg
- DT 22/07 *Regional Financial Development and Bank Competition:  
Effects on Economic Growth*  
Juan Fernández de Guevara Radoselovics y Joaquín Maudos Villarroya
- DT 23/07 *Política fiscal e instituciones presupuestarias en los países  
de la reciente ampliación de la Unión Europea*  
Carlos Mulas-Granados, Jorge Onrubia Fernández y Javier Salinas Jiménez
- DT 24/07 *Measuring International Economic Integration:  
Theory and Evidence of Globalization*  
Iván Arribas Fernández, Francisco Pérez García y Emili Tortosa-Ausina
- DT 25/07 *Wage Inequality among Higher Education Graduates:  
Evidence from Europe*  
José García Montalvo
- DT 26/07 *Governance of the Knowledge-Intensive Firm*  
Vicente Salas Fumás
- DT 27/07 *Profit, Productivity and Distribution: Differences Across Organizational Form*  
Emili Grifell-Tatjé y C. A. Knox Lovell
- DT 28/07 *Identifying Human Capital Externalities: Theory with Applications*  
Antonio Ciccone y Giovanni Peri
- DT 01/08 *A Multiplicative Human Development Index*  
Carmen Herrero Blanco, Ricardo Martínez Rico y Antonio Villar Notario
- DT 02/08 *Real Exchange Rate Appreciation in Central and Eastern European Countries:  
Why the Balassa-Samuelson Effect Does Not Explain the Whole Story*  
José García Solanes
- DT 03/08 *Can International Environmental Cooperation Be Bought?*  
Cristina Fuentes Albero y Santiago J. Rubio Jorge
- DT 04/08 *On the Dynamics of Globalization*  
Iván Arribas Fernández, Francisco Pérez García y Emili Tortosa-Ausina
- DT 05/08 *Los motores de la aglomeración en España: Geografía versus historia*  
Francisco J. Goerlich Gisbert y Matilde Mas Ivars
- DT 06/08 *Sobre el tamaño de las ciudades en España:  
Dos reflexiones y una regularidad empírica*  
Francisco J. Goerlich Gisbert y Matilde Mas Ivars

- DT 07/08 *Managing Waiting Lists in a Fair Way*  
Carmen Herrero
- DT 08/08 *Estimación del capital social en España: Series temporales por territorios*  
Francisco Pérez García, Lorenzo Serrano Martínez  
y Juan Fernández de Guevara Radoselovics
- DT 09/08 *Estimation of Social Capital in the World: Time Series by Country*  
Francisco Pérez García, Lorenzo Serrano Martínez  
y Juan Fernández de Guevara Radoselovics
- DT 10/08 *Capabilities and Opportunities in Health*  
Carmen Herrero y José Luis Pinto Prades
- DT 11/08 *Cultural Transmission and the Evolution of Trust  
and Reciprocity in the Labor Market*  
Gonzalo Olcina Vauteren y Vicente Calabuig Alcántara
- DT 12/08 *Vertical and Horizontal Separation in the European Railway Sector:  
Effects on Productivity*  
Pedro Cantos Sánchez, José Manuel Pastor Monsálvez y Lorenzo Serrano Martínez
- DT 01/09 *How Effective Are Rewards Programs in Promoting Payment Card Usage?:  
Empirical Evidence*  
Santiago Carbó-Valverde y José Manuel Liñares-Zegarra
- DT 02/09 *Comparative Advantage Across Goods and Product Quality*  
Francisco Alcalá
- DT 03/09 *El transporte ferroviario de alta velocidad: Una visión económica*  
Javier Campos Méndez, Ginés de Rus Mendoza e Ignacio Barrón de Angoit
- DT 04/09 *¿En qué circunstancias está justificado invertir en líneas  
de alta velocidad ferroviaria?*  
Ginés de Rus Mendoza y Chris Nash
- DT 05/09 *Openness and Geographic Neutrality:  
How Do They Contribute to International Banking Integration?*  
Iván Arribas Fernández, Francisco Pérez García y Emili Tortosa-Ausina
- DT 06/09 *Firms' Main Market, Human Capital and Wages*  
Francisco Alcalá y Pedro J. Hernández
- DT 07/09 *Tax Evasion, Technology Shocks and the Cyclicalities of Government Revenues*  
Judith Panadés Martí
- DT 08/09 *Parameterizing Expectations for Incomplete Markets Economies*  
Francesc Obiols-Homs
- DT 09/09 *Endogenous Financial Intermediation*  
Radim Boháček y Hugo Rodríguez Mendizábal
- DT 10/09 *The Economic Impact of Migration:  
Productivity Analysis for Spain and the United Kingdom*  
Mari Kangasniemi, Matilde Mas Ivars, Catherine Robinson y Lorenzo Serrano Martínez

DT 11/09 *Time, Quality and Growth*

Francisco Alcalá

DT 12/09 *Competing Technologies for Payments:*

*Automated Teller Machines (ATMs), Point of Sale (POS) Terminals  
and the Demand for Currency*

Santiago Carbó-Valverde y Francisco Rodríguez-Fernández

DT 13/09 *Education, Utilitarianism and Equality of Opportunity*

Aitor Calo-Blanco y Antonio Villar Notario













## Fundación **BBVA**

---

Plaza de San Nicolás, 4  
48005 Bilbao  
España  
Tel.: +34 94 487 52 52  
Fax: +34 94 424 46 21

Paseo de Recoletos, 10  
28001 Madrid  
España  
Tel.: +34 91 374 54 00  
Fax: +34 91 374 85 22  
[publicaciones@bbva.es](mailto:publicaciones@bbva.es)  
[www.bbva.es](http://www.bbva.es)

