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November 2008

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ABSTRACT

European vs. American Hours Worked: Assessing the Role of the Extensive and Intensive Margins^{*}

Europeans have worked less than Americans since the 1970s. In this paper, we quantify the relative importance of the extensive and intensive margins of aggregate hours of market work on the observed differences. Our counterfactual exercises show that the two dimensions of the extensive margin, the employment rate and the participation rate, explain the most of the total-hours-gap between regions. Moreover, both ratios have similar weight. Conversely, the intensive margin, measured by the number of hours worked per employee, has the smallest role.

JEL Classification: E2, J2

Keywords: hours of market work, participation, employment, intensive and extensive margins

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Introduction

Several recent contributions have focused on the decline in aggregate hours of market work in Europe, particularly relative to the United States (US). This growing literature is motivated by the remarkable size of this phenomenon. Why Europeans have worked less than Americans since the 1970s? A large number of papers show that differences across countries in the effort at work are mainly due to quantitatively important differences along the unemployment rate¹. Nevertheless, for Rogerson (2006), the “*increases in relative unemployment are a very small part of the relative decrease in hours of work*”. For him, “*this suggest that a disproportionate amount of effort has been directed at studying the unemployment differential at the expense of the much larger and more basic issue of differences in time allocations.*” Prescott (2004) and Ohanian *et al.* (2006) then argue that virtually all of the large differences between the two regions are due to differences in tax systems, *via* their effects on the average hours worked per employee.

A first limitation of these analysis is that, as long as the authors focus on the average hours worked per employee, they don't disentangle the intensive margin of the total hours worked from the extensive margin. Nevertheless, the observed dynamics of these two margins are quite different, suggesting that they result from the specific choices of individuals. The second limitation is that these papers use the basic growth model where the dynamics of aggregate hours is governed by the labor supply elasticity². Nevertheless, the calibration of this elasticity is hard to reconcile with micro-econometric evidences³. The Hansen (1985) and Rogerson (1988) papers show how to match aggregate labor market fluctuations with general equilibrium models in which the restrictions on preferences are in accordance with micro-econometric evidences. The crucial point of these papers is the distinction

¹On this point, Jackman *et al.* (1991), Mortensen and Pissarides (1999), Blanchard and Wolfers (2000) or Ljungqvist and Sargent (2007a), (2007b) and (2008), among others, consider that the large increase of the unemployment rate observed after 1980 in the European countries, is an important factor of the dynamics of total hours.

²This limitation is in accordance with the objective of explaining only the average hours worked.

³Alesina, Glaeser, and Sacerdote (2005) already point out that the “Prescott's argument, *i.e.* taxes explain US/Europe differences, relies critically on assumptions that ensure an elasticity of labor supply that is hard to reconcile with most standard estimates of labor supply.

between intensive (assumed to be constant) and extensive margins (the employment rate). On the other hand, the policy implications of several institutions on the labor market are different for the employment (the extensive margin) than for the individual hours worked per employee (the intensive margin). Indeed, the rigidities induced by the labor market institutions could be more relevant to explain the extensive margin dynamics, whereas labor taxes could be more relevant to explain the intensive margin dynamics⁴.

This suggests that an unified theory of the total hours worked (business-cycle and long-run dynamics) must simultaneously account for the dynamics of all the margins in coherence with previous theoretical and empirical findings. In the way of finding an acceptable theory, a first step consists in providing some “stylized facts” on the aggregate hours dynamics and its decomposition between intensive and extensive margins. With this aim, in this paper we deal with the following questions: Do Europeans work less than Americans because their individual effort at work is lower? Do Europeans work less because they face a lower probability of being at work than Americans? Do Europeans work less because the number of labor market participants is lower than in the US? We then evaluate the contribution of each component of the total hours of market work to the observed differential in the total hours worked in five European countries relative to the US. Our results show the following. First, the two dimensions of the extensive margin, the employment rate and the participation rate, together explain the most of the total-hours-gap with the US. The intensive margin, measured by the number of hours worked per employee, has the smallest role. This suggest that the extensive margin matters either to explain the evolution of total hours of market work, and the differences across countries. Second, both ratios (the employment and the participation rates) have similar weight in explaining the dynamics of the extensive margin.

The remaining of the paper is organized as follows. First, we present the data for the six countries of our sample: Belgium, Spain, France, Italy, United Kingdom (UK) and United States, from 1960 to 2003. These data put in evidence the size and the evolution of the hours (of market work) gap between European countries and the US economy. Next, we measure the contribution of individual hours, employment

⁴For a deeper discussion on this point, see Langot and Quintero-Rojas (2008).

and participation to this gap.

1 The evolution of total hours worked and its components, 1960-2003

As in Rogerson (2006), aggregate hours of market work (H) is simply the product of employment (N) and annual hours of work per person in employment (h), normalized by the population aged 15-64 (L). This variable may be decomposed as follows:

$$H = \underbrace{h}_{\text{Hours per employee}} \times \underbrace{\frac{N}{A}}_{\text{Employment rate}} \times \underbrace{\frac{A}{L}}_{\text{Participation rate}}$$

where A denotes the active population (employment plus unemployment).

Data on employment, unemployment and population are from the OECD.⁵, whereas data on hours worked are from the Groningen Growth and Development Center and the Conference Board⁶.

1.1 The historical data

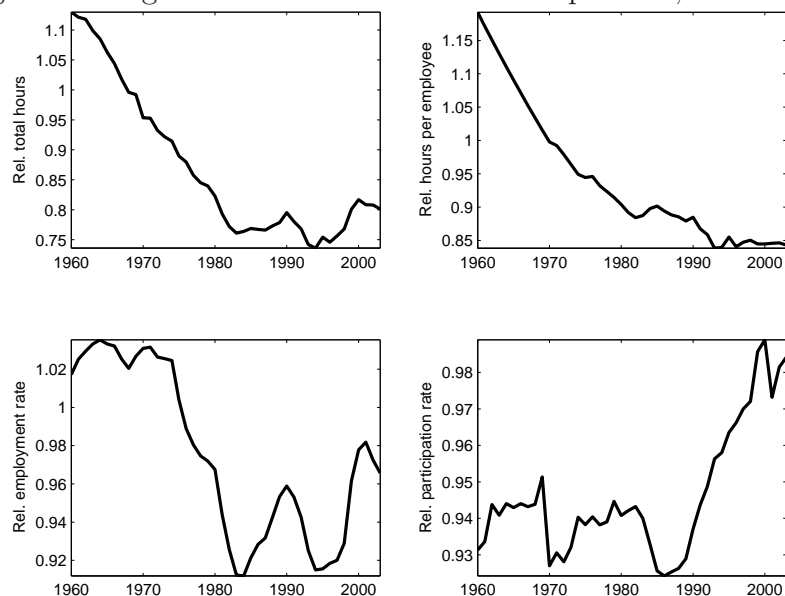
For the six countries of our sample: Belgium, Spain, France, Italy, United Kingdom (UK) and United States (US), we inspect the evolution over 1960-2003 of the aggregate hours worked, and its components. We take as reference value the US in 1970. The series for each country are plotted in figures 1 to 6. First of all, we remark that in the UK the relative hours worked are higher than the reference value (*i.e.*, the US in 1970) over the whole period. Apart from Italy, before 1970 the hours worked (both total and individual) were higher in Europe than in the US, but after they were declining until around 1980. Afterwards, hours per employee still decrease in most countries, but aggregate hours were roughly stable in Belgium, France and Italy and slightly increasing in Spain, the UK and the US. Indeed, the decline of the hours per employee was compensated by the increase in the employment rates since the mid 1980s in all countries excepting France. Moreover, we also observe that all

⁵ *OECD Statistics, beta 1.0*: <http://stats.oecd.org/wbos/default.aspx>

⁶ *Total Economy Database, January 2007*: <http://www.ggdc.net>

countries experienced increasing participation rates since the mid 1980s, and even since the early 1970s in Italy and the US.

Figure 1: Belgium - Total hours and its components, 1960-2003.



Measures relative to the US in 1970.

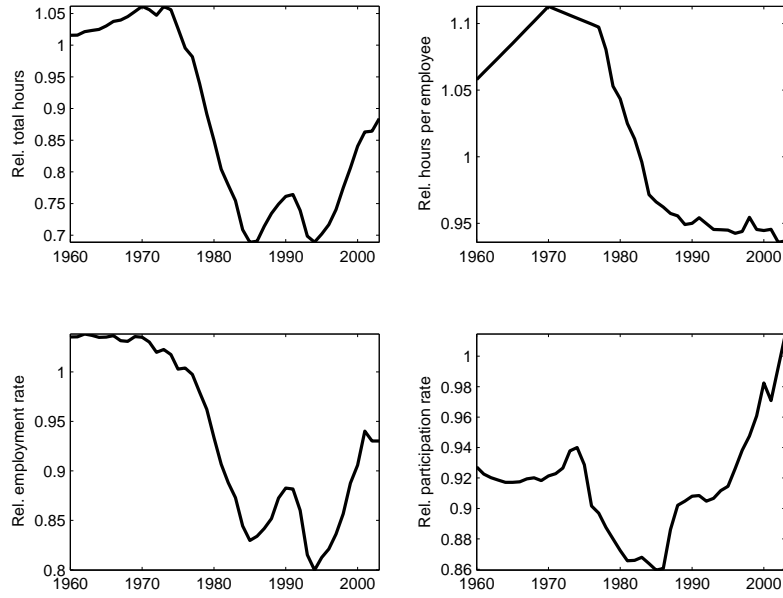
1.2 The hours gap between regions

Figure 7 shows the dynamics of the total-hours-worked-differential between each European country and the US. The observed gap is simply computed as:

$$\Delta_{i,t}^{obs} = H_{i \neq us,t} - H_{us,t}$$

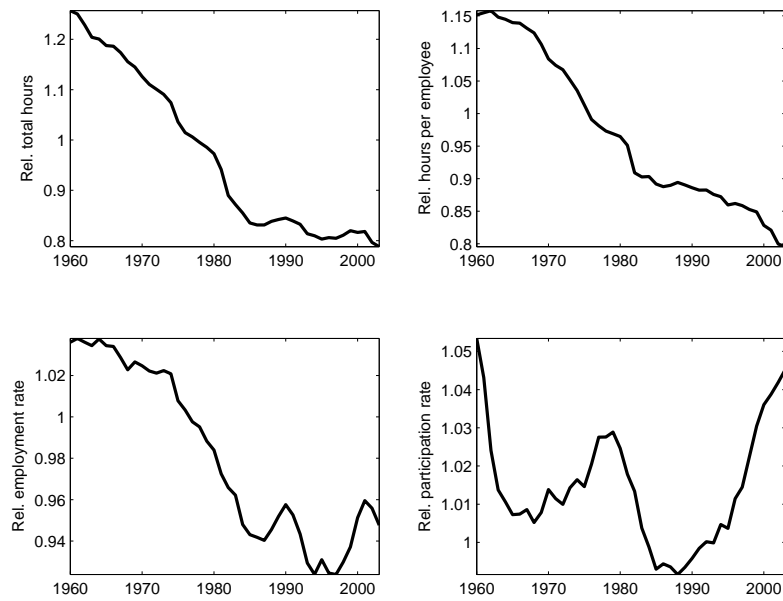
Apart from Spain, the total hours of market work were higher in European countries than in the US until around 1970. Afterwards, the converse is true. Moreover, for all Europeans countries the hours differential is sharply increasing until the mid 1985, consistent with the above discussion. Why the evolution of total hours worked was diverging among regions? Why Europeans have worked less than Americans since the 1970s? To shed some light on this, in next section we asses the explanatory power of each component of the total hours to the observed transatlantic gap.

Figure 2: Spain - Total hours and its components, 1960-2003.



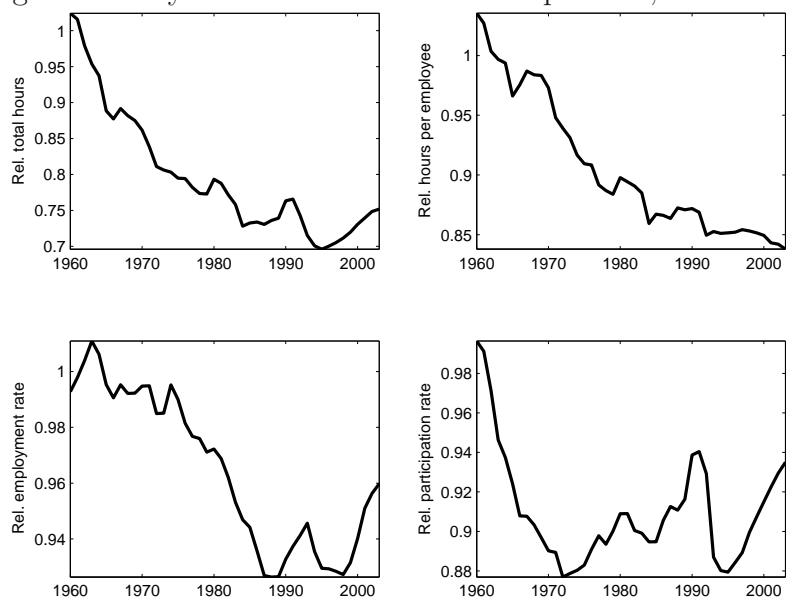
Measures relative to the US in 1970.

Figure 3: France - Total hours and its components, 1960-2003.



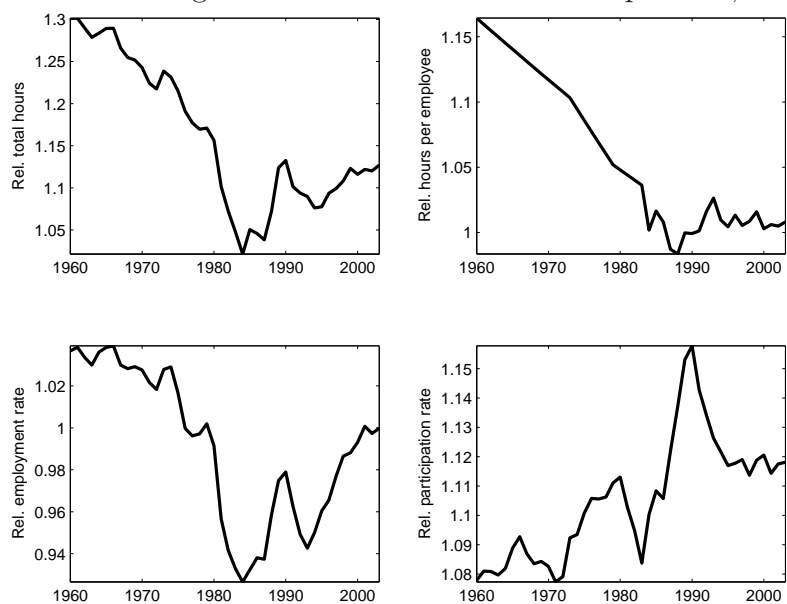
Measures relative to the US in 1970.

Figure 4: Italy - Total hours and its components, 1960-2003.



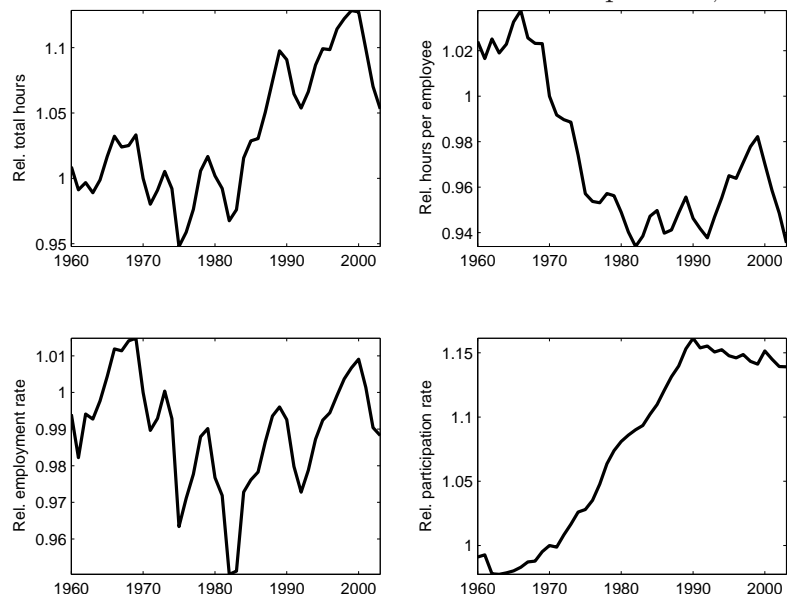
Measures relative to the US in 1970.

Figure 5: United Kingdom - Total hours and its components, 1960-2003.



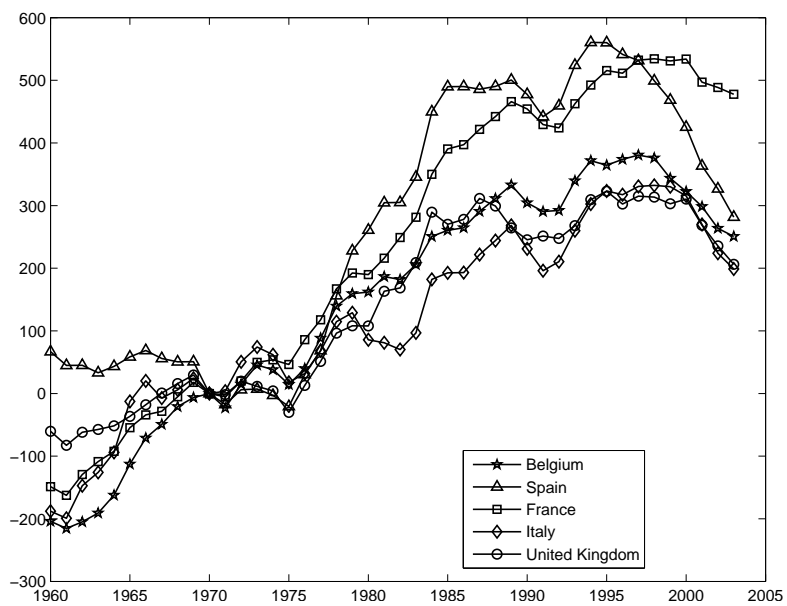
Measures relative to the US in 1970.

Figure 6: United States - Total hours and its components, 1960-2003.



Measures relative to the US in 1970.

Figure 7: Observed differential with the US in the total hours of market work.



2 Measuring the contribution of individual hours, employment and participation to the hours gap

In this section we propose several counterfactuals in the lines of that proposed by Rogerson (2006). The goal is to assess the role of each dimension of the total hours worked in accounting for the total hours gap with the US. We show that, apart from France, the extensive margin has the main role. In plain words, if the employment and the participation rates were still the same in Europe than in the US, the observed gap in the total hours in these two regions would be quite small.

2.1 The contribution of the hours worked per person in employment

The counterfactual is constructed as follows. First, for each country we compute the change in the number of hours worked per employee between each date t and the reference year t_0 (1970):

$$\Delta_{i,t}^h = h_{i,t} - h_{i,t_0}$$

Next, we compute the change for each European country with respect to the change in the US:

$$r\Delta_{i,t}^h = \Delta_{i,t}^h - \Delta_{us,t}^h$$

for $i \neq us$. Then, $r\Delta_{i,t}^h$ measures the differential in the hours worked per employee relative to the US (and to the reference year). Then, we consider the hypothetical in which the change in the hours per employee in the European countries did not happen. Instead, we assume that employed workers in Europe were working the same number of hours as the employees in the US. This would rise aggregate hours in country $i \neq us$ by an amount equal to:

$$\Delta_{i,t}^{H,h} = \frac{N_{i,t}}{A_{i,t}} \times (-\Delta_{i,t}^h)$$

Finally, the comparison of these series with the observed differential in relative total hours (Δ^{obs}) give us an idea of the “importance” of the contribution of individual hours to the total hours worked gap. The more the contribution of individual hours is important, the more the hypothetical series will be close to the actual ones.

2.2 The contribution of the employment rate

Now, we compute the contribution of the employment rate to the total hours gap by considering the hypothetical in which the change in country $i \neq us$'s employment rate did not happen. Instead, assume that in each country the employment rate was the same as in the US in date t . This let us generate the series $\Delta_{i,t}^{H,n}$, which measures the contribution of the employment rate to the (total) hours gap between each country and the US. Similarly, the comparison of these counterfactual series with the actual ones provides a measure of the “importance” of this variable in accounting for the total hours differential between the European countries and the US. Results are displayed in the middle panel of figures 8 - 12.

2.3 The contribution of the participation rate

Finally, we consider the hypothetical in which the participation rate $a = \frac{A}{L}$ was the same in each European country than in the US. From this we generate the series $\Delta_{i,t}^{H,a}$, which measures the contribution of the participation dimension of the extensive margin to the (total) hours gap relative to the US. The more the counterfactual series are close to the actual ones, the more the participation rate is “important” for explaining the observed total hours differential between the two regions.

2.4 Quantitative Results

Results from these exercises are shown in the top panels of figures 8 - 12. We observe that in most countries the role of the intensive margin seems to be important before the mid 1970s. Thereafter, the contribution of the average hours per employee is very poor: the wedge between the two series is quite large. Results concerning the employment (participation) rate are showed in the middle (bottom) panels of the figures. In general, the two dimensions of the extensive margin have a minor impact before the 1970s. Thereafter, in all countries the relevance of the three variables is quite similar. The only exception is Italy, where the participation rate accounts for the largest part.

Figure 8: Belgium - Contribution of individual hours, employment and participation

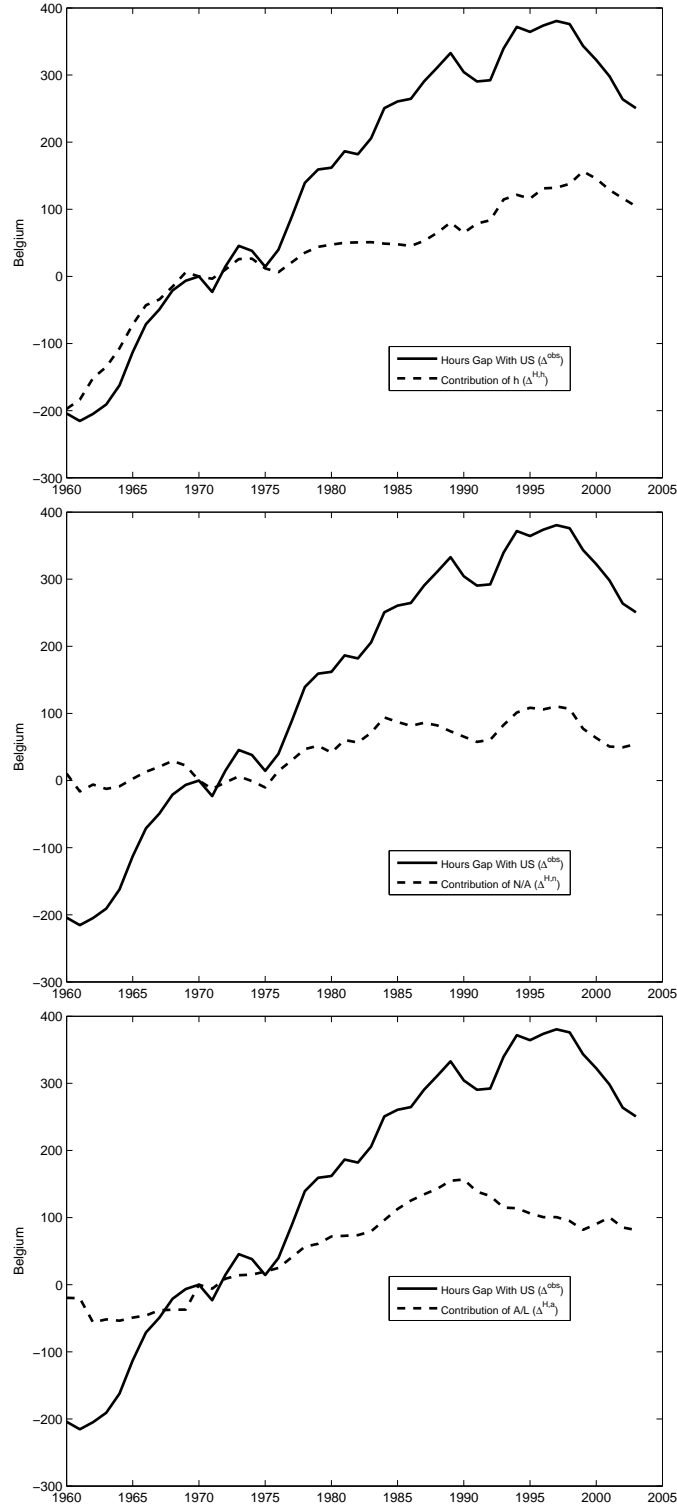


Figure 9: Spain - Contribution of individual hours, employment and participation

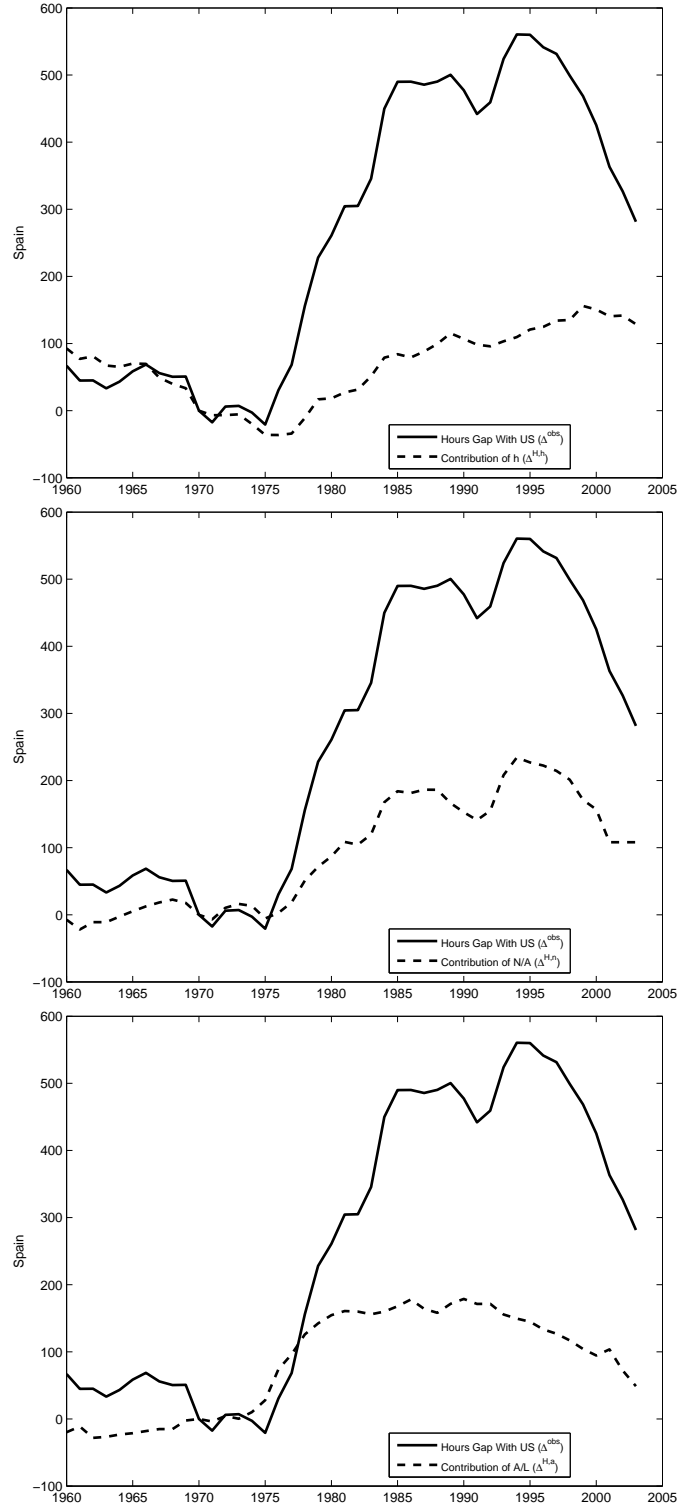


Figure 10: France - Contribution of individual hours, employment and participation

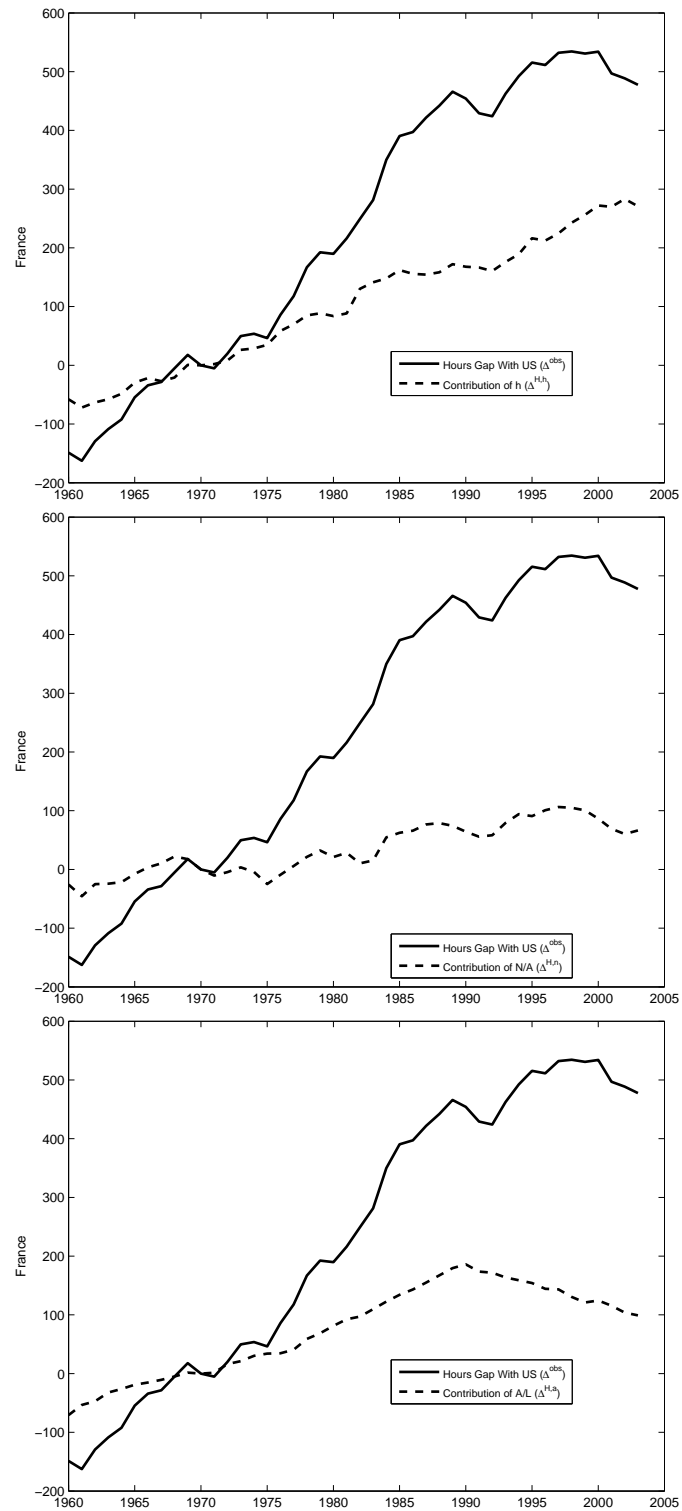


Figure 11: Italy - Contribution of individual hours, employment and participation

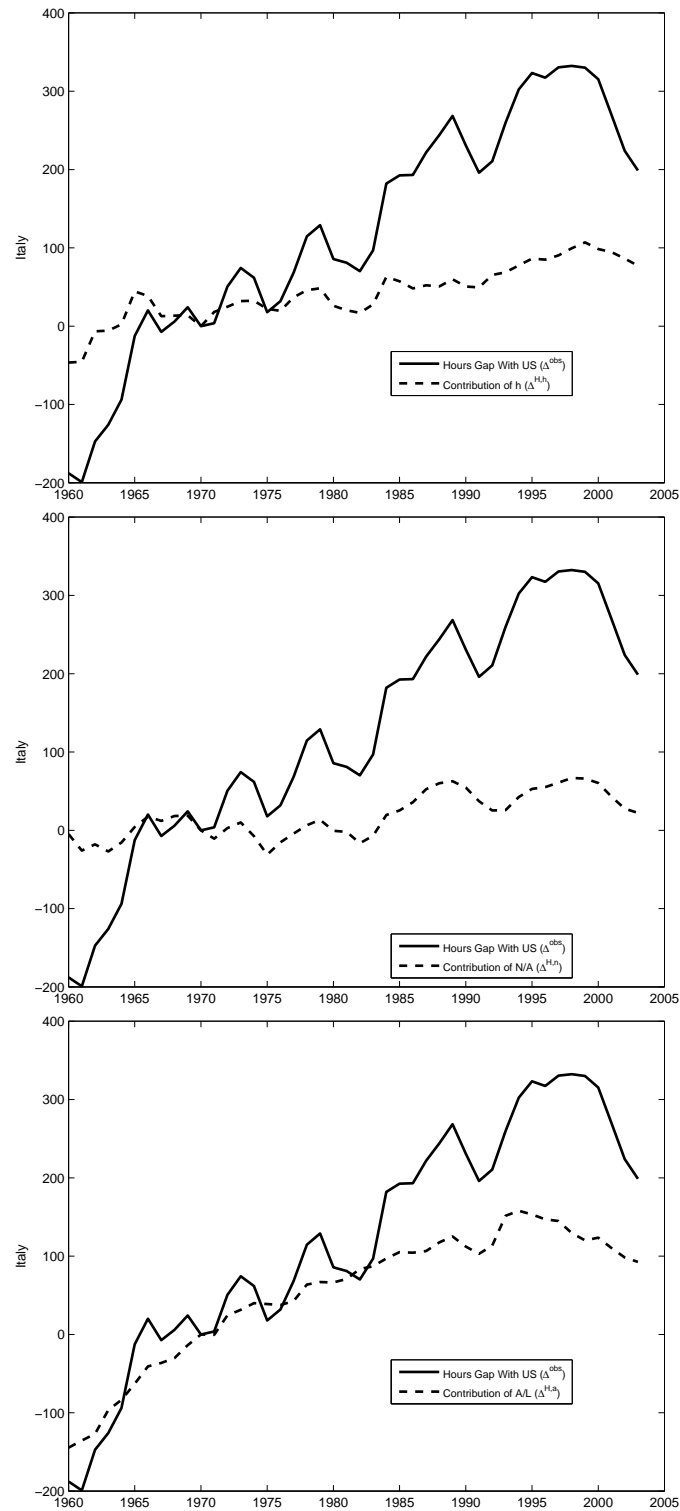
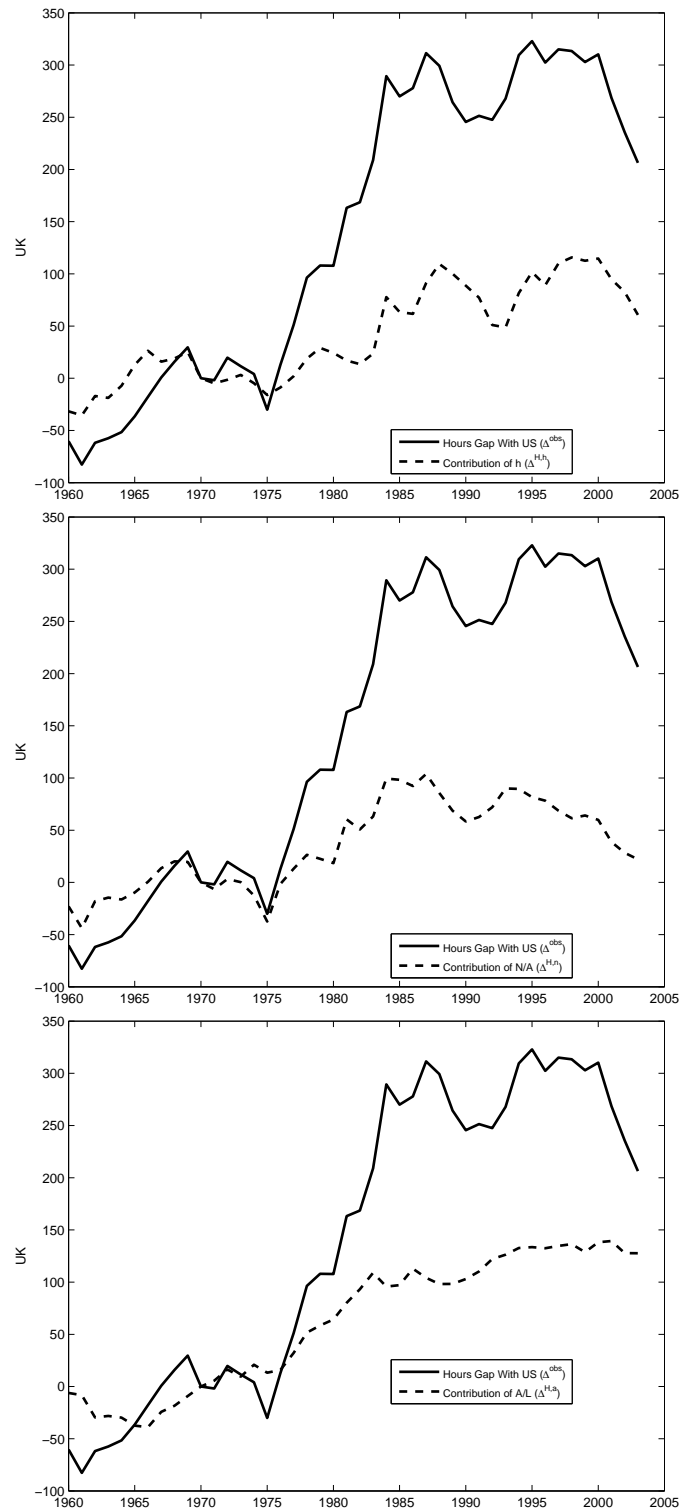


Figure 12: United Kingdom - Contribution of individual hours, employment and participation



2.5 Intensive margin *vs* extensive margin

Finally, we assess how much of the transatlantic gap in the aggregate hours worked is due to the intensive margin and how much is due to the extensive margin. To this end, we compare the contribution of the additional hours that European countries would have if all employed workers were working as much as American workers ($\Delta_{i,t}^{H,h}$), versus the additional hours that European countries would have if both the participation rates and the employment rates were the same as in the United States ($\Delta_{i,t}^{H,n} + \Delta_{i,t}^{H,a}$). As we can see from figures 13 and 14, about 2/3 of the observed fall in the total hours of market work in European countries, relative to the US, is mostly explained by the dynamics of the extensive margin (that is, by the employment and the participation), and roughly 1/3 by the dynamics of the intensive margin (the hours worked per employee), particularly after the 1980s.

Conclusion

Our results point out that the three components of the the total hours of market work have similar relevance in shaping the dynamics of the total hours of market work. Moreover, since the 80s the dynamics of the extensive margin of total hours explain the most of the observed falling work hours in European countries, relative to the US. Finally, in terms of economic policy design, it seems very important to distinguish the two margins of the total hours of work. The reason is that policies such as taxation affect mostly the hours worked per employee, whereas most of the effects of labor market institutions passes through the employment (but not necessarily through the unemployment) and the participation. We have in mind, in particular, the specific programs for the elderly workers.

Figure 13: Intensive margin *vs* extensive margin: Belgium, Spain and France

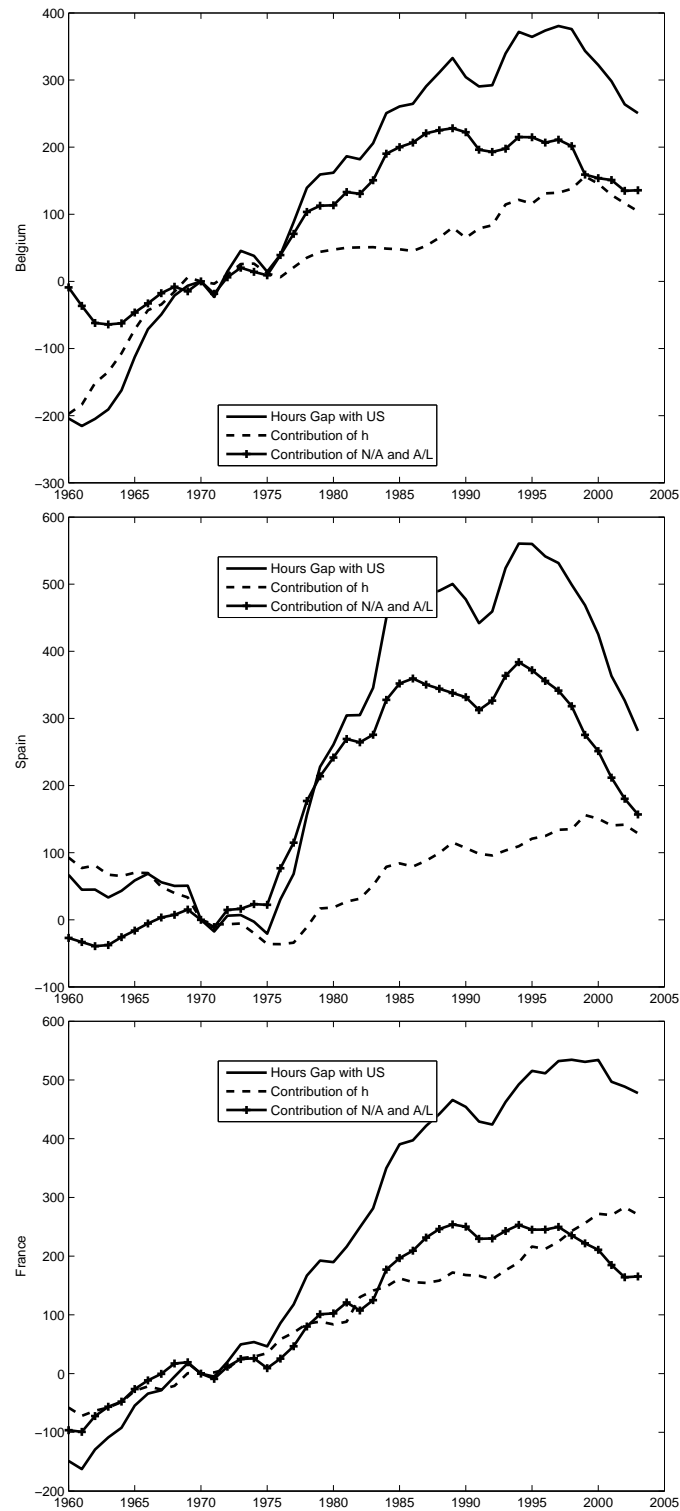
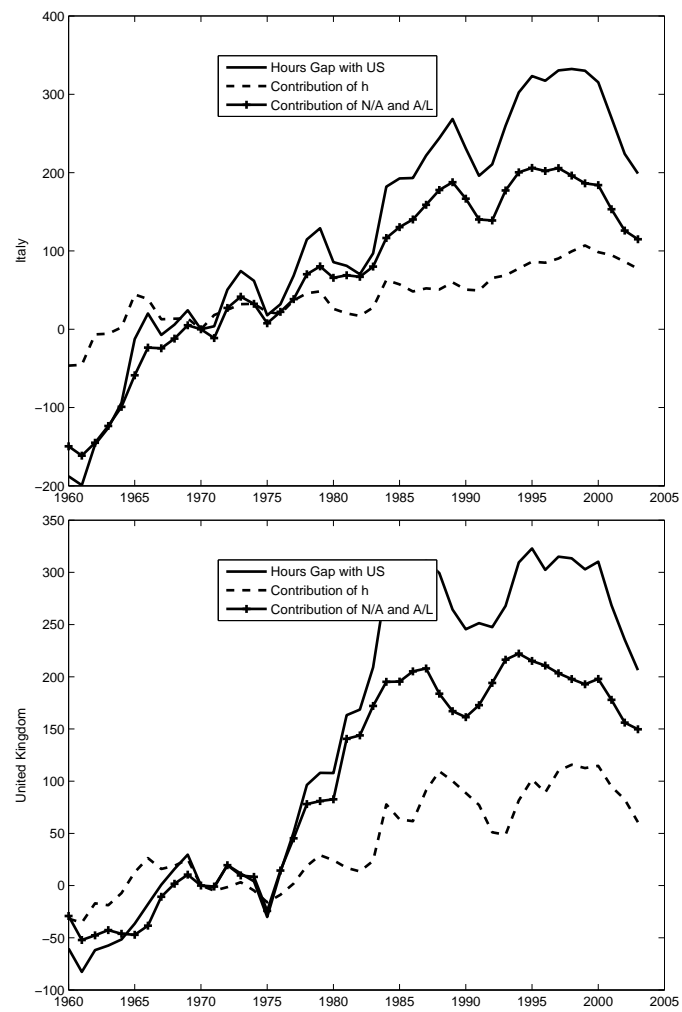


Figure 14: Intensive margin *vs* extensive margin: Italy and United Kingdom



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