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THE ROLE OF SHOCKS AND INSTITUTIONS IN THE RISE OF EUROPEAN UNEMPLOYMENT: THE AGGREGATE EVIDENCE

Olivier Blanchard
Justin Wolfers

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ABSTRACT

Two key facts about European unemployment must be explained: the rise in unemployment since the 1960s, and the heterogeneity of individual country experiences. While adverse shocks can potentially explain much of the rise in unemployment, there is insufficient heterogeneity in these shocks to explain cross-country differences. Alternatively, while explanations focusing on labor market institutions explain cross-country differences explain current heterogeneity well, many of these institutions pre-date the rise in unemployment. Based on a panel of institutions and shocks for 20 OECD nations since 1960, we find that the interaction between shocks and institutions is crucial to explaining both stylized facts. We test two specifications, and each offers significant support for our interactions hypothesis. The first speculation assumes that there are common but unobservable shocks across countries, and that these shocks have a larger and more persistent effect in countries with poor labor market institutions. The second constructs series for the macro shocks, and again finds evidence that the same size shock has differential effects on unemployment when labor market institutions differ. We interpret this as suggesting that institutions determine the relevance of the unemployed to wage-setting, thereby determining the evolution of equilibrium unemployment rates following a shock.

Olivier Blanchard
Department of Economics
MIT, E52-373
50 Memorial Drive
Cambridge, MA 02139
and NBER
blanchar@mit.edu

Justin Wolfers
Department of Economics
Harvard University
Littauer Center
Cambridge, MA 02138
jwolfers@kuznets.fas.harvard.edu

Fig 1 shows the evolution of unemployment in Europe since 1960. The figure plots average unemployment rates over 5–year intervals, starting in 1960, both for the OECD–Europe as a whole (the line) and for 15 individual OECD–Europe countries.[1] It shows the increase in the overall unemployment rate, from 1.7% in the early 1960s to 11.0% in the mid 1990s, together with the large dispersion in unemployment rates across countries, from 4.0% in Switzerland to more than 20% in Spain in the mid 1990s.

Explanations for these evolutions fall into three classes:

- Explanations that focus on the role of adverse economic shocks. Adverse shocks can indeed increase the unemployment rate, at least for some time. And there are many plausible candidates for such adverse shocks over the last 30 years. As unemployment started rising in the 1970s, the focus was on oil price increases and the TFP growth slowdown. Since then, the evolution of the real interest rate, and other shifts in labor demand have been added to the list.

  Explanations based solely on shocks run however into a major empirical problem. Shocks can potentially explain the general increase in unemployment over time. But, as we shall see, they do not differ enough across coun-

1. The 8 time periods are 1960–1964 to 1990–1994, and 1995+ (typically 1995–1996.) The 15 countries included in OECD–Europe are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. Left out are Greece, Iceland and Luxembourg, for which we could not construct time series for all the explanatory variables used later in the article. The unemployment rates are the rates according to national definitions, rather than standardized rates—which typically do not exist back to 1960 (For the period when both unemployment rates exist, using one or the other makes little difference.) Also, while the figures only show what has happened in Europe, the regressions we run later look at all available OECD countries; they include, in addition to Europe, the United States, Canada, Australia, New Zealand, and Japan.

Fig 1 Unemployment Rate, E15

tries to explain the cross–country variation so evident in Fig 1.

- Explanations that focus on the role of adverse labor market institutions. Labor market institutions affect the nature of unemployment, and some can indeed potentially generate a high unemployment rate. With the persistence of high unemployment for now more than two decades, explanations based on adverse institutions ("labor market rigidities") have become steadily more popular.

  Explanations based solely on institutions also run however into a major empirical problem: Many of these institutions were already present when unemployment was low (and similar across countries), and, while many became less employment–friendly in the 1970s, the movement since then has been mostly in the opposite direction. Thus, while labor market institutions can potentially explain cross country differences today, they do not appear able to explain the general evolution of unemployment over time.

- Explanations that focus on the interaction of adverse shocks with adverse market institutions. Some institutions may affect the impact of shocks on unemployment. For example, better coordination in bargaining may lead to a faster adjustment of real wages to a slowdown in productivity growth. Some institutions may affect the persistence of unemployment in response to shocks. For example, if labor market institutions lead to a labor market with long unemployment duration, adverse shocks are more likely to lead some of the unemployed to become disenfranchised, reducing the pressure of unemployment on wages, thereby slowing, and possibly even halting the return to lower unemployment.

  It is easy to see what makes this third class of explanations attractive. It has the potential to explain not only the increase in unemployment over time (through adverse shocks), but also the heterogeneity of unemployment evolutions (through the interaction of the shocks with different labor market institutions).

In a companion paper (Blanchard [1999]), we took stock of the underlying alter-

native theories. We looked at whether and how different shocks and different institutions may affect the unemployment rate. We looked at the channels through which shocks and institutions might interact. This led us to argue in favor of the third class of explanations. In this article, we look at the aggregate empirical evidence more formally, at the role of shocks, institutions, and interactions, in accounting for the evolution of European unemployment.

To do so, we look at the data through two panel data specifications. In the first, we assume unobservable but common shocks across countries. In the second, we construct and use country–specific time series for a number of shocks. In both specifications, we allow for an interaction between shocks and institutions: The effect of a given shock on unemployment is allowed to depend on the set of labor market institutions of the country.

We see the results as surprisingly (at least given our priors) good: Specifications that allow for shocks, institutions, and interactions can account both for much of the rise and much of the heterogeneity in the evolution of unemployment in Europe. The magnitudes of the effects of the shocks on unemployment are plausible. The magnitudes of the effects of institutions are equally so. And their interactions explain much of the difference across countries.

These results notwithstanding, three caveats are in order. First, the results are preliminary. In many cases, we do not have time series for institutions, and the series we have may not be very good. Second, the results are typically weaker when we allow for time–varying rather than time–invariant measures for institutions. This gives some reasons to worry. Last, the fact that the specifications fit the data does not prove that the underlying theories are right; just that they are not obviously inconsistent with the aggregate data.

We believe we are the first to analyze the panel data evidence looking simultaneously at shocks, institutions and interactions. But we build on a large number of previous studies. Bruno and Sachs [1985] were among the first to emphasize

both shocks and institutions in the initial rise in unemployment. An empirical attempt to explain U.K unemployment as a result of shocks, institutions, and interactions was presented by Layard et al. [1991] in their book on unemployment. Two recent influential studies are by Phelps [1994] and by Nickell [1997]. We differ mostly from Phelps by allowing for institutions, and for interactions. We differ mostly from Nickell by allowing for observable shocks, and by having a panel data dimension going back to the 1960s. Our results are partly consistent with those of Phelps with respect to shocks, and largely consistent with those of Nickell with respect to institutions.

Our article is organized as follows: Section 1 looks at shocks, both across countries and over time. Section 2 does the same for institutions. Section 3 discusses potential interactions between shocks and institutions. Section 4 reports the results of estimation under the assumption of unobservable but common shocks across countries. Section 5 reports the results of estimation using country-specific time series for shocks. Section 6 concludes.[2]

1 Shocks

Three shocks appear to have played an important role in the increase in European unemployment. (This short declarative sentence conveys more certainty than is justified. Caveats follow.)

The decline in TFP growth

Starting in the early 1970s, Europe suffered a large decrease in the underlying rate of total factor productivity (TFP) growth. This is shown in Fig 2.[3] The two lines

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2. We shall use the existence of the companion paper as an excuse for keeping our discussion of theoretical issues, and of relevant references, to a minimum.

3. We first construct the rate of TFP growth for each year and each country. We do so by computing

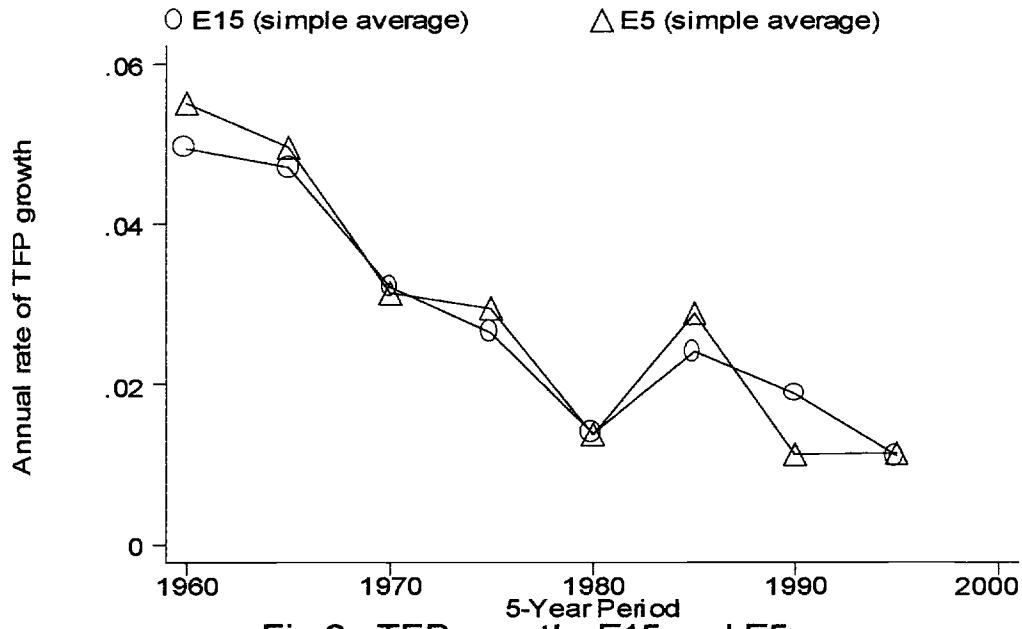

Fig 2a TFP growth, E15 and E5

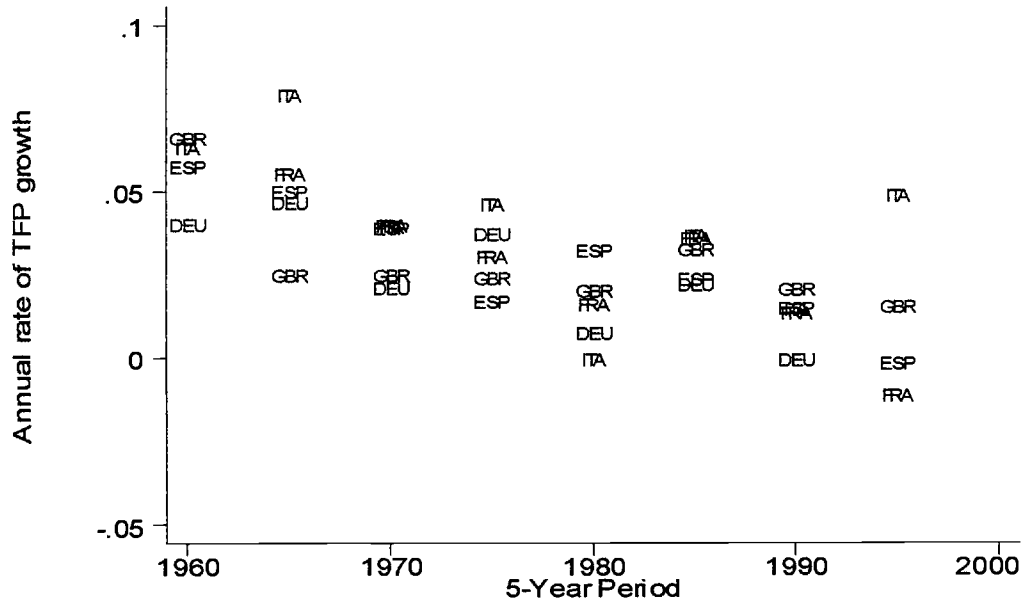

Fig 2b TFP growth, E5

in Fig 2a give the evolution of the average rate of TFP growth for the 15 countries of OECD–Europe (E15 in what follows) and for the 5 largest European countries, France, Germany, Italy, Spain, and the United Kingdom (E5). To give a sense of the heterogeneity across countries, Fig 2b gives the evolution of TFP growth in each of the E5 countries. (Showing all 15 countries would clutter the figure but yield similar conclusions). TFP growth which had been close to 5% in the 1960s decreased to 3% in the first half of the 1970s, and to 2% in the second half of the 1970s. It has remained around 2% since then. The decline has affected countries in roughly similar fashion.[4]

This decrease in TFP growth was initially partially hidden by the large increase in the relative price of oil and other raw materials. Thus, much of the focus of the initial research (for example Bruno and Sachs [1985]) was on this increase in relative prices rather than on the slowdown in TFP growth. In retrospect, the slowdown in TFP growth from its unusually high level in the first 30 years after World War II was surely the more important shock of the period.[5]

There is no question that a slowdown in TFP growth can lead to a higher equilibrium unemployment rate for some time (we prefer to use "equilibrium rate" rather than "natural rate", but the meaning is the same.) All that is needed is

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the Solow residual for the business sector, and then dividing it by the labor share in the sector. Under the assumption of Harrod neutral technological progress—the assumption that allows for steady state growth—this is the right measure of technological progress, and gives the rate at which real wages can grow along the balanced growth path. We then take averages for each 5–year period, for each country. E5 and E15 are constructed as simple (unweighted) averages of TFP growth over countries.

4. Note that, in contrast to the other observations which are based on five yearly observations, the observation for 1995 is typically based on only one year (1995) or two years (1995 and 1996). Thus, one year can make a lot of difference. This is the case for Italy in this figure.

5. An early article on that theme is Grubb et al. [1982].

that it takes some time for workers and firms to adjust expectations to the new lower underlying rate, leading to wage growth in excess of productivity growth for some time. Can the effects of such a slowdown on unemployment be permanent? Theory suggests that the answer, to a first approximation, is no. Once expectations have adjusted, the effect on unemployment should mostly go away. There lies the first puzzle of European unemployment. The initial shock is clearly identified. But, after more than twenty years, it is hard to believe that its effects are not largely gone. So, what accounts for today's high unemployment? There is much less agreement here, but two other shocks appear relevant.

The real interest rate

Fig 3a gives the evolution of the average real interest rate for both the E15 and the E5. Fig 3b gives the real interest rate for each of the E5 countries. [6]

Fig 3 shows that, both for the E15 and the E5 countries, the real rate turned from positive in the 1960s to sharply negative in the second half of the 1970s, and then to large and positive in the 1980s and the 1990s. For some countries, the decline in the 1970s was nearly as dramatic as the ensuing increase. Fig 3b shows how the real rate in Spain went down from 2% in the 1960s to –5% in the mid 1970s, back to 5% in the 1980s and the 1990s. For others, such as Germany, the real rate has remained much more stable.

Why might such changes in the real interest rate affect the equilibrium unemployment rate?[7] Because they are likely to affect capital accumulation, and so,

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6. We first compute the real interest rate for each year and each country, as the nominal long rate on government bonds minus a five-year average of lagged inflation. We then take averages for each 5–year period.

7. The focus here is on the effects on the equilibrium unemployment rate. Changes in the real interest rate also affect the deviation of actual unemployment from the equilibrium rate. We focus on that effect below.

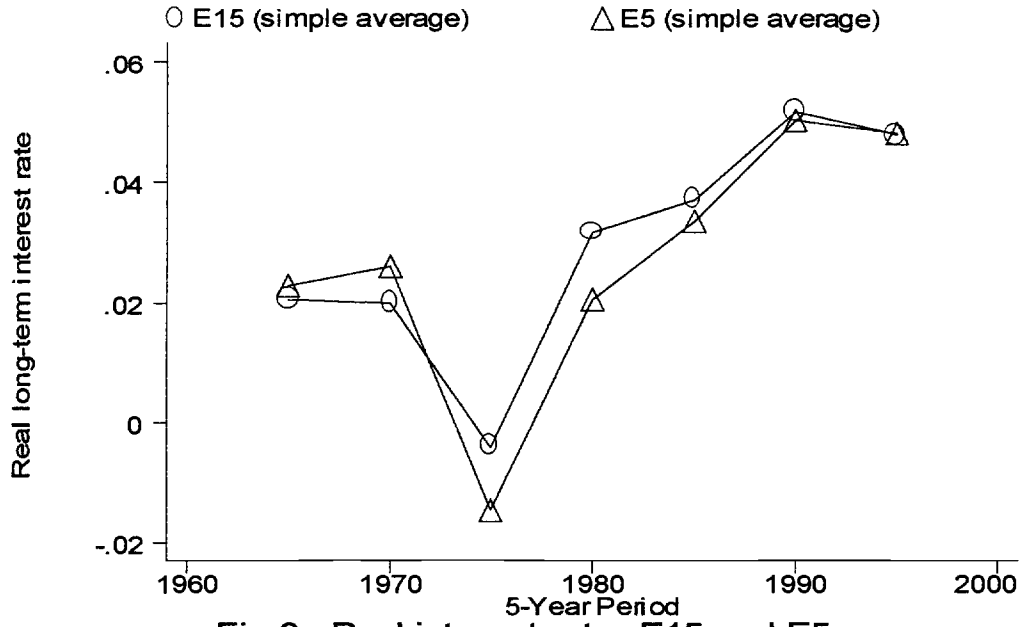

Fig 3a Real interest rate, E15 and E5

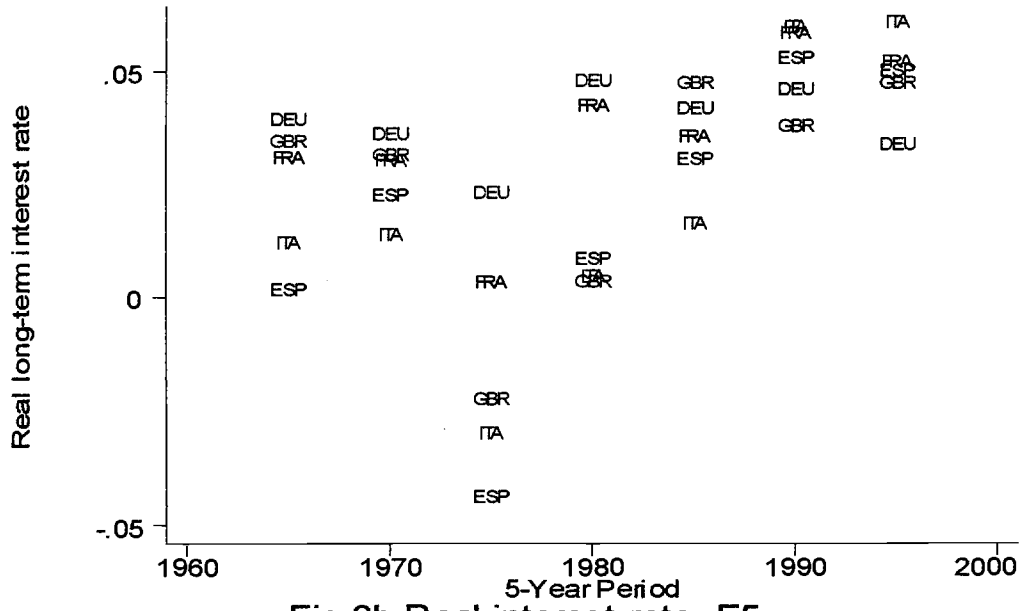

Fig 3b Real interest rate, E5

at a given wage (and thus a given ratio of employment to capital), to shift labor demand. Are the effects on unemployment likely to be permanent? Theory is largely agnostic here. Again, a plausible answer is that long run effects, if present, are likely to be small.

It is clear from Fig 3 that the pattern of interest rates may help explain why unemployment kept increasing in the 1980s, even as the effects of lower TFP growth on unemployment were—presumably—declining. This suggests that, had real interest rates been stable, unemployment would have been higher in the 1970s, and lower in the 1980s. Put another way, the low real interest rates of the 1970s delayed some of the increase in unemployment by a decade or so. The higher real interest rates since the early 1980s may help explain why unemployment has remained high in the 1980s and the 1990s.

Shifts in labor demand

Fig 4 gives the evolution of the log of the labor share for both the E15 and the E5 (normalized to equal zero in 1960). For both groups of countries, the evolution of the share is quite striking. After increasing in the 1970s, the labor share started decreasing in 1980s and the decline has continued since then. For the E5, the labor share is now 10% lower than it was in 1960; for the E15, it is 8% lower.

Why look at the evolution of the labor share? Suppose that technology were characterized by a Cobb–Douglas production function, both in the short and the long run. The decrease in the share since the 1980s would then reflect either technological bias away from labor—a decrease in the coefficient on labor in the production function— or a decrease in the wage relative to the marginal product of labor. In either case, the implication would be an adverse shift in labor demand and thus a potential source of unemployment in the 1980s and 1990s.[8]

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8. Let $Y = N^{a}K^{1-a}$. Let the ratio of the wage to the marginal product of labor $w/Y_n \equiv \mu$. μ is equal to 1 under perfect competition in both goods and labor markets, but may differ from 1

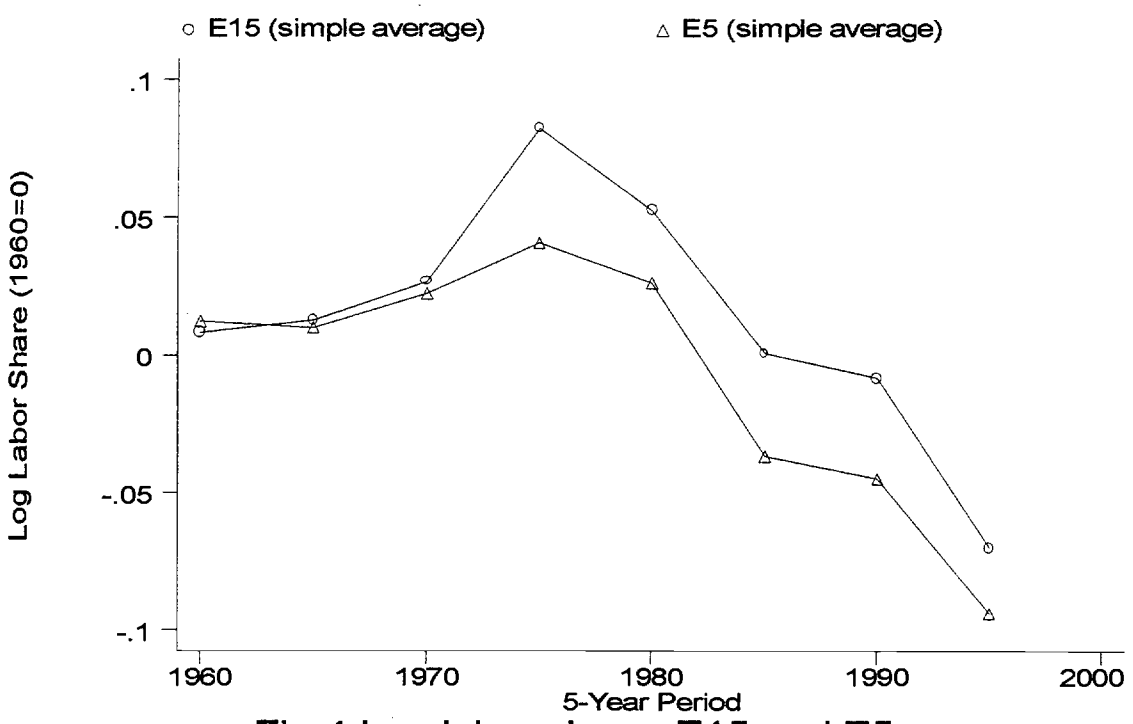

Fig 4 Log labor share, E15 and E5

The elasticity of substitution may be equal to one in the long run, but it is surely less than one in the short run. In that case, movements in the share will also reflect the dynamic response of factor proportions to factor prices. Indeed, much of the increase in the labor share in the 1970s surely reflects the effects of the increase in the real wage relative to TFP growth together with a low short-run elasticity of substitution, and some of the decrease since then reflects the adjustment of proportions over time. In Blanchard [1997], we argued however that more has been at work than the adjustment of factor proportions to factor prices, and that the large decline in the share reflects a genuine adverse shift in labor demand.

We shall use the measure of the shift in labor demand constructed in that earlier article. This measure can be thought as the log of the labor share purged of the effects of factor prices on the share in the presence of a low elasticity of substitution in the short run. Fig 5a plots the evolution of this measure of the labor demand shift for both the E5 and the E15. Fig 5b plots the evolution of the measure for each of the E5 countries. Both figures show how the adjustment eliminates much of the increase and subsequent unwinding in the share in the 1970s (visible in Fig 4). Fig 5a shows little movement in the measure until the mid 1980s, with a strong decrease thereafter. Fig 5b shows the sharp difference between the UK where, if anything the shift has been positive (the underlying labor share has remained roughly constant) and countries such as Spain or France (where the adverse shift has exceeded 10%).[9]

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otherwise. Then the share of labor $\alpha = a\mu$. A decrease in α reflects a decrease in a or a decrease in μ. Also labor demand can be written as $\log N = \log Y - \log w + \log \alpha$. A decrease in $\log \alpha$ leads to an equal decrease in $\log N$ given output and the wage. This is why we look at the log share.

9. This distinction between Anglo–Saxon and Continental countries is discussed in Blanchard [1997]. The difference in evolutions reflects divergence rather than convergence of the shares in levels: For the last period (1995+), the labor share in the business sector was 62% for France and Spain, versus 70% for the UK and 67% for the US. (The caveat about the dangers of comparing

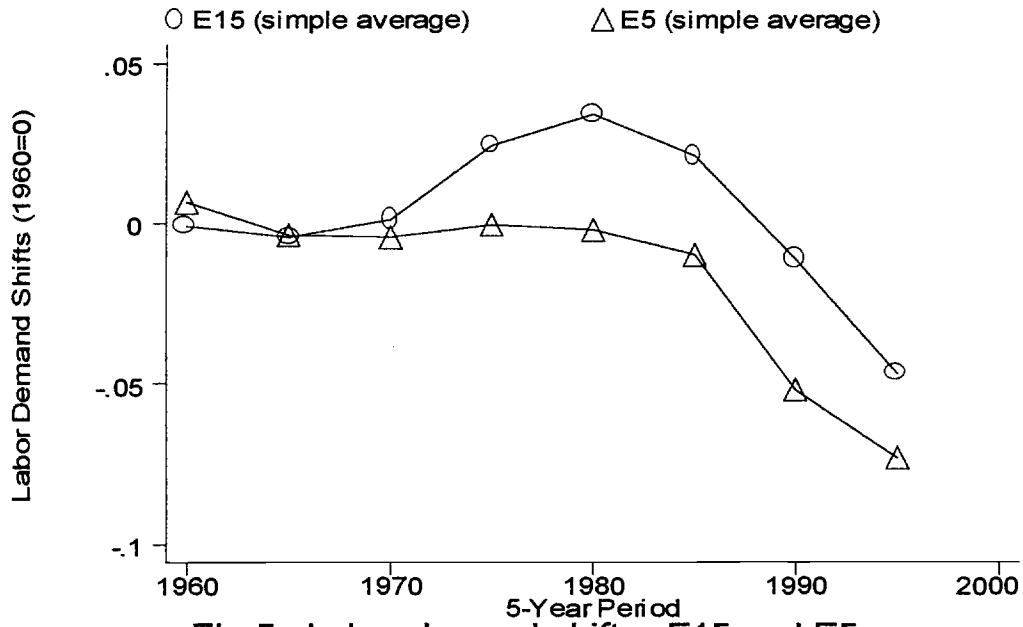

Fig 5a Labor demand shifts, E15 and E5

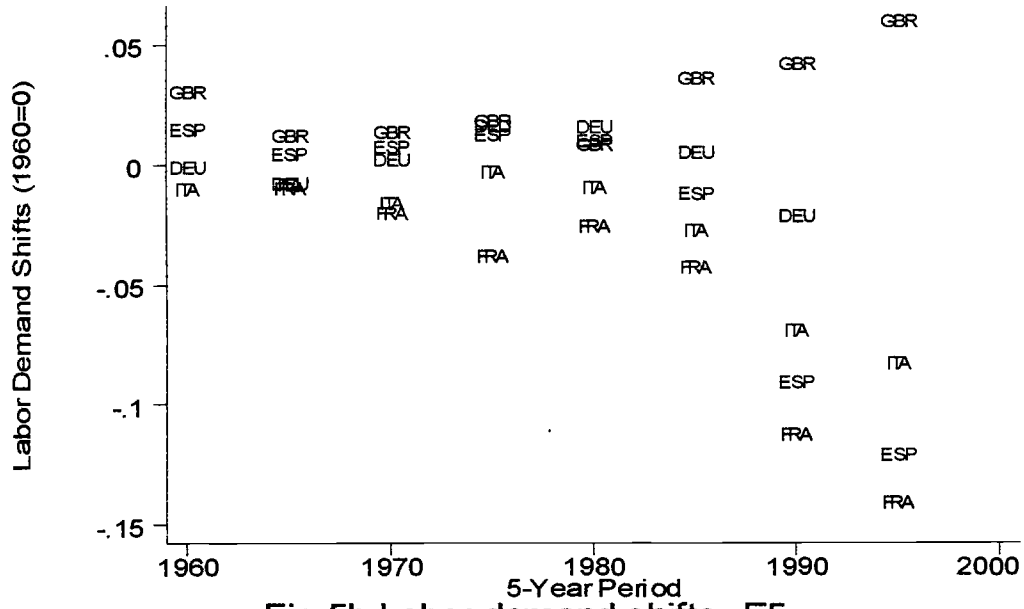

Fig 5b Labor demand shifts, E5

Such an adverse shift in labor demand can clearly lead to higher equilibrium unemployment for some time. Its dynamic effects however are quite different from those of the two shocks we looked at earlier. Think for example of the shift as coming from a reduction in labor hoarding by firms—one of the interpretations suggested in Blanchard [1997]. As firms get rid of redundant workers, the result will be a decrease in employment, and so an increase in unemployment. Thus, such a shift has the potential to explain why unemployment has remained high in many countries in the 1990s. But the decrease in labor hoarding also leads to higher profit, which in turn should lead, over time, to capital accumulation and higher employment. This is a relevant point to keep in mind when one thinks about the future. If it is the case that such a shift is indeed responsible for some of the unemployment of the 1990s, then this suggests a brighter future, as the favorable effects start dominating and lead to an increase in employment over time.

Equilibrium versus actual unemployment

We have focused so far on factors that affect equilibrium unemployment. There is no question however that part of the evolution of unemployment in Europe comes from the deviation of actual unemployment from equilibrium unemployment.

In environments of low to medium inflation, the change in inflation is likely to be a good signal of where equilibrium unemployment is relative to actual unemployment. Decreasing inflation is likely to reflect an unemployment rate above the equilibrium rate; increasing inflation reflects the reverse. Fig 6a shows the evolution of the change in inflation for the E5 and the E15. Fig 6b shows the evolution of the change in inflation for each of the E5.[10] The change in inflation was positive in the 1970s, suggesting an actual unemployment rate below the equilibrium rate.

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share levels across countries applies.)

10. We first construct the change in inflation (using the business sector GDP deflator) for each year and each country. We then take the average for each 5-year period.

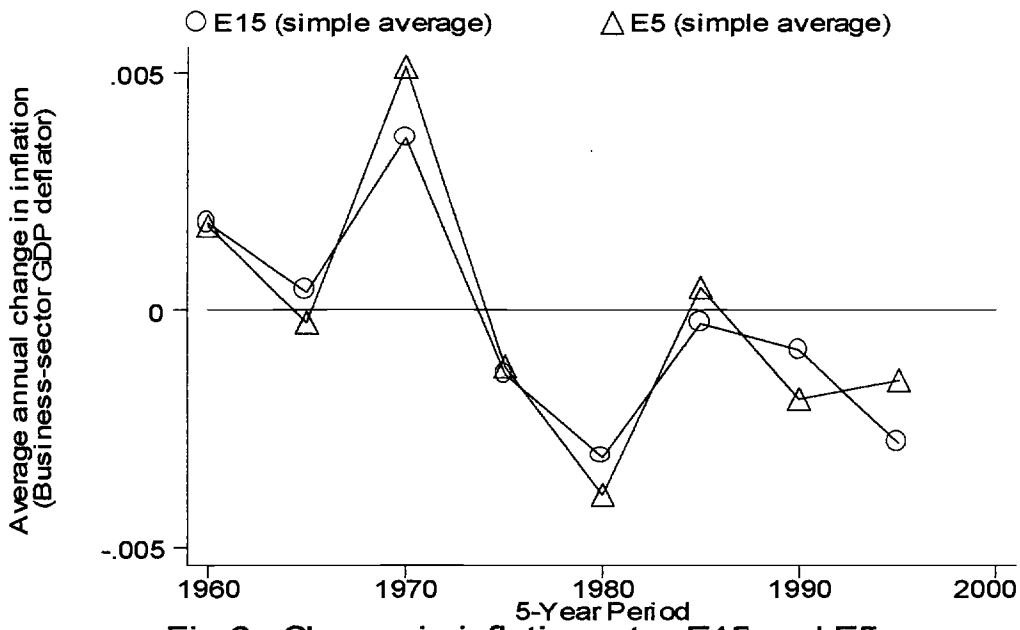

Fig 6a Change in inflation rate, E15 and E5

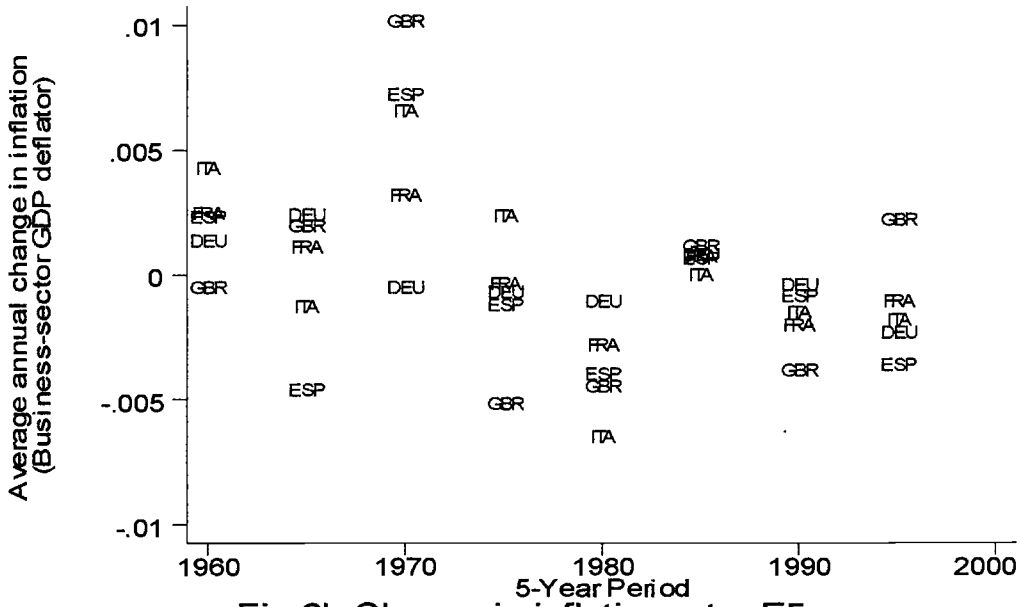

Fig 6b Change in inflation rate, E5

The change in inflation has been negative since then, suggesting the equilibrium rate has been lower than the actual rate. In other words, macroeconomic policy probably delayed some of the increase in unemployment from the 1970s to the 1980s. And, as inflation is still slowly declining, actual unemployment probably exceeds equilibrium unemployment at this point. By how much is difficult to say: the relation between the change in inflation and the deviation of unemployment from its equilibrium may well be different at very low inflation.

Two caveats as we end this section. First, what we have taken as "shocks" are at best proximate causes, and should be traced to deeper causes. This is particularly clear for real interest rates and labor demand shifts. Second, there may well have been other shocks, from increased turbulence (although the quantitative evidence on this is not very supportive), to shifts in the relative demand for skilled and unskilled workers (although, on this point as well, the evidence for Europe is mixed. See for example Nickell and Bell [1994].) We have not explored their role here.

To conclude: This section suggests the following story. Europe was hit with major adverse shocks in the 1970s, oil price increases, but also, and more importantly, a large and sustained decrease in TFP growth. Unemployment increased, but the adverse impact was initially softened both by lower real interest rates and a macroeconomic policy leading to less of an increase in actual than in equilibrium unemployment. As the effect of the adverse shocks of the 1970s receded, higher interest rates and tight macroeconomic policy contributed to higher equilibrium and actual unemployment in the 1980s. Finally, adverse labor demand shifts can potentially account for why unemployment has remained high in the 1990s. Thus, shocks appear to have the potential to explain the broad evolution of European unemployment. But, at least to the naked eye, differences in the evolution of unemployment across countries seem difficult to trace back to differences in shocks.

2 Institutions

While in the 1970s the discussion of the rise of unemployment focused primarily on shocks, the persistence of high unemployment for another two decades has led to a shift in focus from shocks to labor market institutions. Indeed, many discussions of European unemployment ignore shocks altogether, and focus exclusively on "labor market rigidities". What typically follows is a long list of so–called "rigidities", from strong unions, to high payroll taxes, to minimum wages, to generous unemployment insurance, to high employment protection, and so on.

We have learned however from theory that things are more complicated. Some of the so–called rigidities may represent rough institutional corrections for other distortions in the labor market. Some institutions may be bad for productivity, for output, and for welfare, but may not lead to an increase in unemployment. A short summary of the large literature —a literature largely triggered by the rise in European unemployment—goes as follows:[11]

- Some labor market institutions increase the equilibrium unemployment rate. First among them is the unemployment insurance system. More generous insurance increases unemployment through two separate channels: The first, and the focus of most microeconomic empirical work, is lower search intensity. The second is the effect on the bargained wage at a given rate of unemployment. Both combine to increase equilibrium unemployment duration, and, by implication, the equilibrium unemployment rate.[12]
- Some labor market institutions change the nature of unemployment, but

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11. A longer discussion is given in our companion paper. A nice theoretical discussion is given by Mortensen and Pissarides [1998]. A wider ranging presentation of both theory and facts is given by Nickell and Layard [1998].

12. The steady state unemployment rate is equal to unemployment duration times the flow into unemployment as a ratio to the labor force. Unemployment benefits increase duration, and leave the flow roughly unchanged, increasing the unemployment rate.

have an ambiguous effect on the equilibrium unemployment rate. This is the case for employment protection. Employment protection both decreases the flows of workers through the labor market, and increases the duration of unemployment. This makes for a more stagnant labor market, with a higher proportion of long–term unemployed. But the effect of lower flows and higher duration on the equilibrium rate itself is ambiguous.

- Some labor market institutions may not have much effect either on the rate or on the nature of unemployment. Their incidence may be mainly on the wage, not on unemployment. This is the case for many of the components of the so called "tax wedge." Some of these components are really not taxes, but rather payments for health benefits, or retirement: The effect of these components on unemployment should be small. As to the tax component, what matters is how taxes affect the ratio of after–tax unemployment benefits to after–tax wages. Taxes which by their nature apply equally on the unemployed and the employed, such as consumption or income taxes, are likely to be roughly neutral. And if the unemployment insurance system tries to achieve a stable relation of unemployment benefits to after–tax wages—a reasonable assumption—even payroll taxes may not matter very much.

Turning to the evidence, the two relevant questions are: How much do labor market institutions vary across countries? And how have they evolved over time?

Thanks to work by the OECD and by a large number of researchers, we have fairly good answers to the first question. The state of knowledge has recently been summarized by Nickell [1997] and Nickell and Layard [1998]. [13] In much of what we do later, we shall use the data for institutions put together by Nickell and described in those two articles. For the moment, suffice it to say that, based on

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13. In addition to the references in these two articles: For a recent comparison of various measures of unemployment insurance, see Salomaki and Munzi [1999]. For a recent comparison of measures of employment protection, see OECD [1999], Chapter 2.

the measures which have been constructed for various labor market institutions, and the cross section evidence: (1) there is substantial heterogeneity across European countries (2) this heterogeneity appears to have the potential to explain differences in unemployment rates across countries *today*: Countries with high unemployment rates typically have less employment–friendly institutions.

This raises the second question, the evolution of institutions over time. The basic question is a simple one. Have European labor market institutions become steadily worse since the early 1970s (in which case explanations based solely on institutions can potentially explain the evolution of unemployment) ? Or do they in fact date back much further, to a time when unemployment was still low (in which case explanations based solely on institutions face a major puzzle)? The question is simple, but the answer is not.

Time series for at least part of the period and a subset of countries have been put together for some institutions—replacement rates, unionization, the tax wedge—by the OECD and other researchers. But, in general, our knowledge of the evolution of institutions is rather limited. We shall look here at two institutions only, unemployment insurance, and employment protection.

- The OECD has constructed a measure of the replacement rate for each country, every two years, going back to 1961. The measure is an average of the replacement rates for different categories of workers, different family situations, and different durations of unemployment. Each replacement rate is constructed as the ratio of pre–tax social insurance and social assistance benefits to the pre–tax wage. Fig 7a gives the evolution of this measure of the replacement rate, for each 5–year period, for each of the E5 countries. The figure clearly shows the different evolutions across countries. In Germany, France, and the UK, the replacement rate was relatively high to start; it has increased a bit in France, decreased a bit in Germany, decreased a bit more in the U.K. In Spain and Italy, the replacement rate was very low at the start. It increased in the 1960s in Spain, and only more recently in Italy.

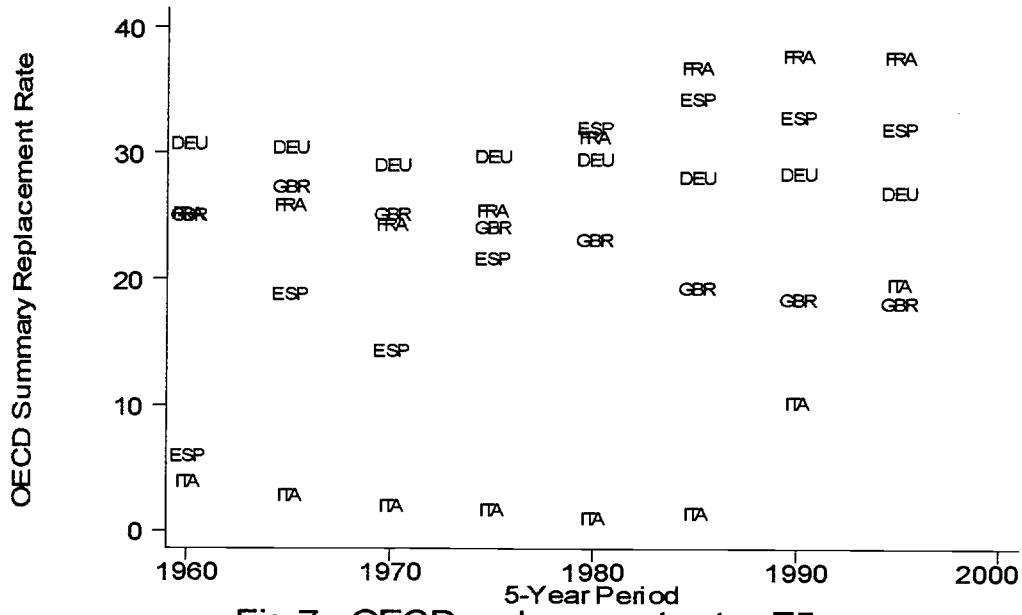

Fig 7a OECD replacement rate, E5

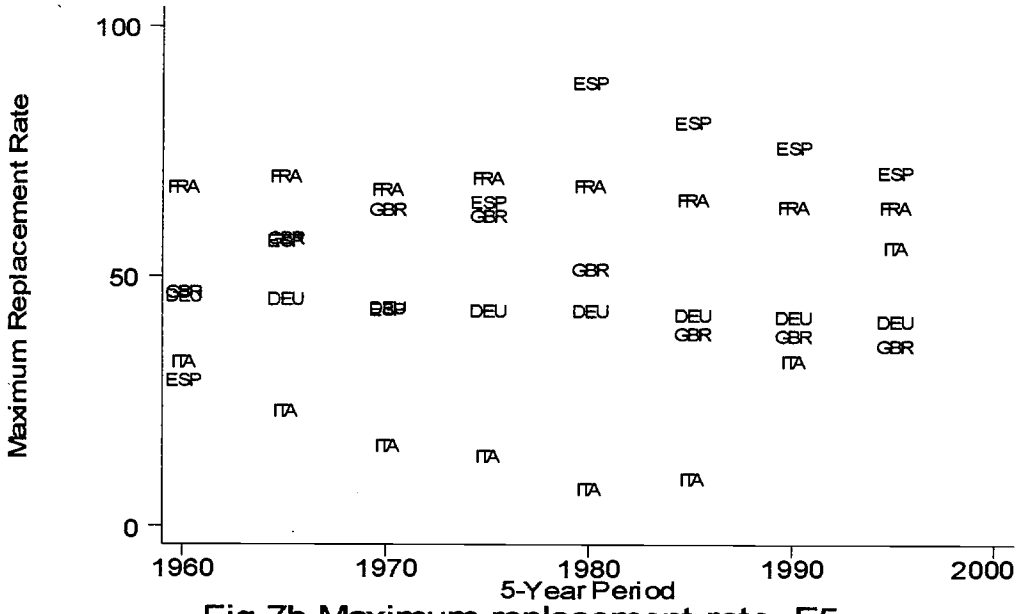

Fig 7b Maximum replacement rate, E5

Both are now at levels comparable to other countries. In short, there is no simple common trend.

The OECD measure is a summary measure of the replacement rate, and in some ways, not a very attractive one. It gives equal weight to the replacement rate in year 1 of an unemployment spell, to the average replacement rate in years 2 and 3, and to the average replacement rate for years 4 and 5; but given the exit rate from unemployment, the generosity of benefits in years 4 and 5 for example is clearly less important for the determination of unemployment than the generosity of unemployment in year 1. Fig 7b provides a different angle by showing the *maximum* replacement rate over all categories and all durations of unemployment for each country and each subperiod. What clearly comes out is how this rate increased until the late 1970s, and how (except for Italy, which has converged from a low maximum replacement rate to the European average) it has decreased since then. In other words, the worst excesses have been largely eliminated. This may be more important than changes in the average replacement rate.

- Putting together series on employment protection is difficult. We have taken a first step by constructing series based on recent work by the OECD (see OECD [1999]), as well as on earlier work by Lazear [1990]. Details of construction are given in the appendix. There are a number of reasons why these series are at best rough approximations to the evolution of employment protection. In particular, the OECD data, which we use to construct the measures from 1985 on, are based on a much broader set of dimensions of employment protection than the Lazear series (notice period and severance pay for a blue collar worker with ten years seniority) which we use to construct the series before 1985.

  This caveat notwithstanding, Fig 8 shows the evolution of the employment protection index for the E5 countries since 1960. (The figure for the E15 would be harder to read, but yield similar conclusions). Note again the diversity of evolutions, and the lack of a simple answer.

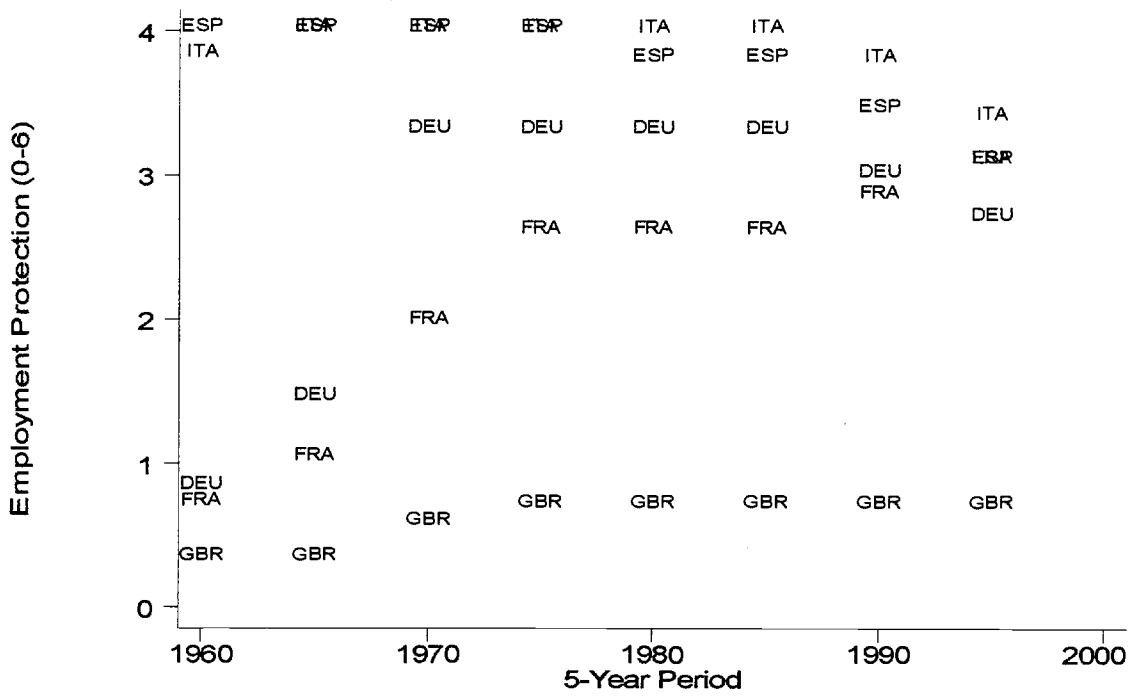

Fig 8 Constructed Employment Protection Index, E5

Spain and Italy appear to have had high employment protection throughout. Employment protection in Spain was high even under Franco, before unemployment increased. In both countries, employment protection has decreased since the mid 1980s—in Spain, largely because of the development of fixed term contracts rather than the weakening of protection for workers on indefinite contracts. In France and Germany, employment protection was low to start with, then increased in the late 1960s and early 1970s, and has been roughly stable since then.[14]

To conclude: There is enough heterogeneity in labor market institutions within Europe to potentially explain differences in unemployment rates today. As to the evolution of institutions over time, it is clear that neither the view that labor market institutions have been stable through time, nor the view that labor market rigidities are a recent development are right. Some countries have had these institutions for a long time, others have acquired them more recently. There clearly was an increase in employment–unfriendly institutions in the late 1960s and early 1970s. Since then, there appears to have been a small but steady decline.

3 Interactions

Our review of facts makes clear why it is tempting to look for explanations of the rise of European unemployment based on the interaction of shocks and institutions: Adverse shocks can potentially explain the general increase in unemployment. Differences in institutions can potentially explain differences in outcomes across countries. This is indeed the direction that has been explored in much of the recent research on unemployment. This section gives a brief assessment of the

14. Informal evidence suggests that employment protection was high in France even in the 1960s. Again, this is not reflected in the Lazear measure, and by implication, not reflected in our measure either. This may be an issue for other countries as well.

current state of knowledge.[15]

One can think of labor market institutions as shaping the effects of shocks on unemployment in two ways. First, they can affect the impact of shocks on unemployment. Second, they can affect the persistence of unemployment in response to shocks.

Most of the initial research explored the first direction, focusing on how the nature and the details of collective bargaining might determine the response of unemployment to various shocks.[16] It pointed for example to the importance of indexation clauses in labor contracts. It also pointed to the potential importance of the level and the structure of collective bargaining: It might be easier for example to achieve a slowdown in wage growth in response to a slowdown in productivity growth if bargaining takes place at the national rather than the firm or sectoral level—where aggregate trends may be less well perceived and understood, and coordination of the slowdown may be more difficult to achieve.

As unemployment remained high, the research shifted to how labor market institutions might also explain the persistence of unemployment in response to shocks.[17] The general idea is as follows. Take an adverse shock which leads to higher unemployment. The normal adjustment mechanism is then for unemployment to put pressure down on wages until unemployment has returned to normal. To the extent that some labor market institutions reduce the effect of unemployment on wages, they will increase the persistence of unemployment in response to shocks. Research has identified a number of such channels. Here is a non–exhaustive list:

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15. Again, see our companion paper for references, and discussion.

16. This was indeed one of the main themes of Bruno and Sachs [1985].

17. This was the motivation behind the admittedly crude "hysteresis model" of unemployment in Blanchard and Summers [1986]. Research since then has shown that while full hysteresis (permanent effects of shocks) is unlikely, institutions can lead to high persistence.

- A rise in unemployment typically comes with higher unemployment duration (rather than higher flows in and out of unemployment). If some of the unemployed remain unemployed for a long time, they may either stop searching or lose skills. Indeed, the two factors reinforce the other: If firms perceive the long term unemployed as more risky, they may be reluctant to hire them, decreasing the incentives of the long term unemployed to search for a job. But if they are not actively searching or employable, these unemployed workers become irrelevant to wage formation. Firms do not consider them. Employed workers do not see them as competition. The pressure of unemployment on wages decreases, and unemployment becomes more persistent. Layard and Nickell [1987] were the first to point to the potential macroeconomic relevance of such duration dependence.

  Why should institutions matter in this context? Because of their effect on the average duration of unemployment. A well documented fact about European labor markets is that, probably because of institutions such as more generous benefits and employment protection, a given unemployment rate is associated with much longer duration than in the United States.[18] And the longer the average duration of unemployment to start with, the more likely the effects above are to play an important role. If an increase in the unemployment rate from 5 to 10% is associated with an increase in unemployment duration from 3 to 6 months, few of the unemployed will become long–term unemployed. If instead, the same increase in the unemployment rate implies an increase in duration from 1 to 2 years, then disenfranchising effects are much more likely to be important.
- Higher unemployment falls unevenly on different groups in the labor market. In most countries, higher unemployment tends to fall disproportionally on the youngest workers and the less educated.

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18. See for example the comparison of the labor markets in Portugal and the United States in Blanchard and Portugal [1999].

Labor market institutions affect the composition of the unemployed, thus affecting the effects of unemployment back on wages. For example, a high minimum wage can both increase the effect of adverse shocks on the unemployment rate of the less educated workers, and—because the minimum wage is fixed—reduce the effect of unemployment on wages. Collective bargaining, to the extent that it reflects primarily the preferences and the labor market prospects of prime–age workers, may also lead to little response of wages to youth unemployment, and thus lead to more persistence in unemployment.

- Higher unemployment may lead to a change in norms—an argument developed in particular by Wilson [1987] in the context of urban poverty in the United States, and by Lindbeck in the context of European unemployment (for example Lindbeck [1995]). As long as unemployment is low, workers may be largely ignorant of the rules governing unemployment insurance, or there may be a stigma attached to being unemployed. After a period of high unemployment, ignorance is likely to disappear; attitudes vis–a–vis unemployment are likely to change. Thus, countries with a more generous welfare system may end up with higher unemployment, even when the shocks are gone.

Other channels have been explored as well: Sargent and Ljundqvist [1995] have explored the effect of unemployment insurance rules on the relation between "turbulence" shocks and equilibrium unemployment. Mortensen and Pissarides [1999] have explored the effect of unemployment insurance and employment protection on the relation between relative demand shifts and equilibrium unemployment. Our understanding of the specific channels and their empirical relevance remains rather primitive. This is still very much work in progress, and there is a need for substantially more theoretical and empirical work. Nevertheless, the general thrust is sufficiently clear for us to explore the potential role of interactions in explaining the evolution of unemployment. This is what we do in the rest of the article.

4 Common unobservable shocks and interactions

In looking more formally at the data, we proceed in two steps. In this section, we treat shocks as unobservable but common across countries—in effect we treat them as time effects. In the next, we treat shocks as observable and country specific.

Our first specification in this section relies on the set of time invariant measures of institutions used by Nickell [1997].[19] The specification we use is the following:

$$u_{it} = c_i + d_t \left(1 + \sum_j b_j X_{ij}\right) + e_{it} \qquad (1)$$

where i is a country index, t a (5–year) period index, and j an institution index. The dependent variable, u_{it}, is the unemployment rate in country i in period t. c_i is the country effect for country i. d_t is the time effect for period t. X_{ij} is the value of institution j in country i (in this first specification, we do not allow for time variation in institutions, so there is no index t.) The specification allows for the effects of the common time effects on unemployment to depend on the specific set of labor market institutions of a country. This dependence is captured by the parameters b_j.

The specification of equation (1) is clearly more a description of the data than the outcome of a tightly specified theory of interactions. It does not distinguish in particular between the effects of institutions on the impact or on the persistence of shocks on unemployment. But it captures the basic hypothesis that, given the same shocks, countries with worse institutions will experience higher unemployment.

We estimate this equation using data from 20 countries—the E15 countries listed

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19. Nickell gives values for these institutions for both 1983-1988, and 1989-1994. We use the average of the two.

and examined earlier, plus the United States, Canada, New Zealand, Australia and Japan. (These countries are clearly important controls for any story about European unemployment). There seems to be little point in looking at year–to–year movements in institutions or in shocks unless one wants to learn more about dynamic effects, and this would take us too far. So, as in earlier figures, we divide time into 8 five-year periods, from 1960–64 to 1995+.

Following Nickell, we use measures for eight "labor market institutions" (The reader is referred to Nickell [1997] for more details):

- Three are measures of different dimensions of the unemployment insurance system: the replacement rate (RR), the number of years over which unemployment benefits are paid (Ben), and a measure of active labor market policies (ALMP).
- One is a measure of employment protection (EP).
- One is a measure of the tax wedge (Tax).
- The last three measure aspects of collective bargaining: union contract coverage (Cov), union density (Den), and (union and employer) coordination of bargaining (Coor).

The results of estimation of equation (1) (by non–linear least squares) are presented in Table 1. All the measures of labor market institutions are defined so that an increase in the measure is expected to increase the effect of an adverse shock on unemployment: the expected sign of each b_j is positive.[20] Also all measures of institutions are constructed as deviations from the cross–country mean; this way the time effects gives the evolution of unemployment for a country with mean values for all 8 institutions.

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20. Thus, we multiply the original Nickell measures of active labor market policies and of coordination by –1. We take the expected effect of employment protection to be that more employment protection leads to a larger effect of adverse shocks on unemployment, and the expected effect of coordination that more coordination reduces the effects of adverse shocks on unemployment

Table 1. Time effects interacted with fixed institutions.

	(1) Coefficients	(2) Range of independent variable		(3) Implied range of effect of shock (mean=1)	
Time effects *	7.3%				
Replacement rate	0.017 (5.1)	–46.3	32.6	0.21	1.55
Benefit length	0.206 (4.9)	–2.0	1.6	0.60	1.33
Active labor policy	0.017 (3.0)	–47.2	9.5	0.20	1.16
Employment protection	0.045 (3.1)	–9.5	9.5	0.58	1.42
Tax wedge	0.018 (3.2)	–17.8	22.2	0.68	1.40
Union coverage	0.098 (0.6)	–1.7	0.3	0.83	1.03
Union density	0.009 (2.1)	–30.4	39.6	0.73	1.36
Coordination	0.304 (5.1)	–2.0	2.0	0.40	1.60
Country effects	yes				
$\bar{R}^2$	0.863				

**: Time effects: Estimated time effect for 1995+ minus estimated time effect for 1960-1965. Column (1): regression results, t–statistics in parentheses. Number of observations: 159.*

The results of Table 1 are surprisingly strong (relative to our priors). The estimated equation gives the following description of the data:

- Estimated time effects account for an increase in the unemployment rate equal to 7.3%. That is, the equation implies that, if a country had had mean values for all eight institutions, its unemployment rate would have grown by 7.3% over the period.
- Coefficients on all 8 institutions have the predicted sign: Higher replacement rates, longer duration of unemployment benefits, higher employment protection, a higher tax wedge, higher union contract coverage and density, lead to a larger the effect of shocks on unemployment. Active labor market policies and coordination lead to a smaller effect (remember our sign convention in defining each institution).

  All coefficients, except for the union coverage variable, are statistically significant.[21]

  To give a sense of magnitudes, column (2) gives the range for each institutional measure (recall that these are deviations from the cross country mean). Column (3) then shows the effect of a given shock for the lowest and highest value of the corresponding institution. The way to read the column is as follows. Take three countries, each with mean values for all institutions except one—say, employment protection (line 5). Take an adverse shock which would raise unemployment by 1 percentage point in the country with the mean value of employment protection. Then the same shock will have an effect of only 0.58 percentage point in the country with the lowest employment protection, but an effect of 1.42 percentage point in the country with the highest employment protection. The conclusion one should draw from column (3) is, given the existing variation in labor market institutions, the range of the effects of institutions on the impact of a given

21. The t–statistics are computed under the assumption of iid residuals. The residuals show however both spatial and serial correlation, and adjusted t-statistics would probably be lower.

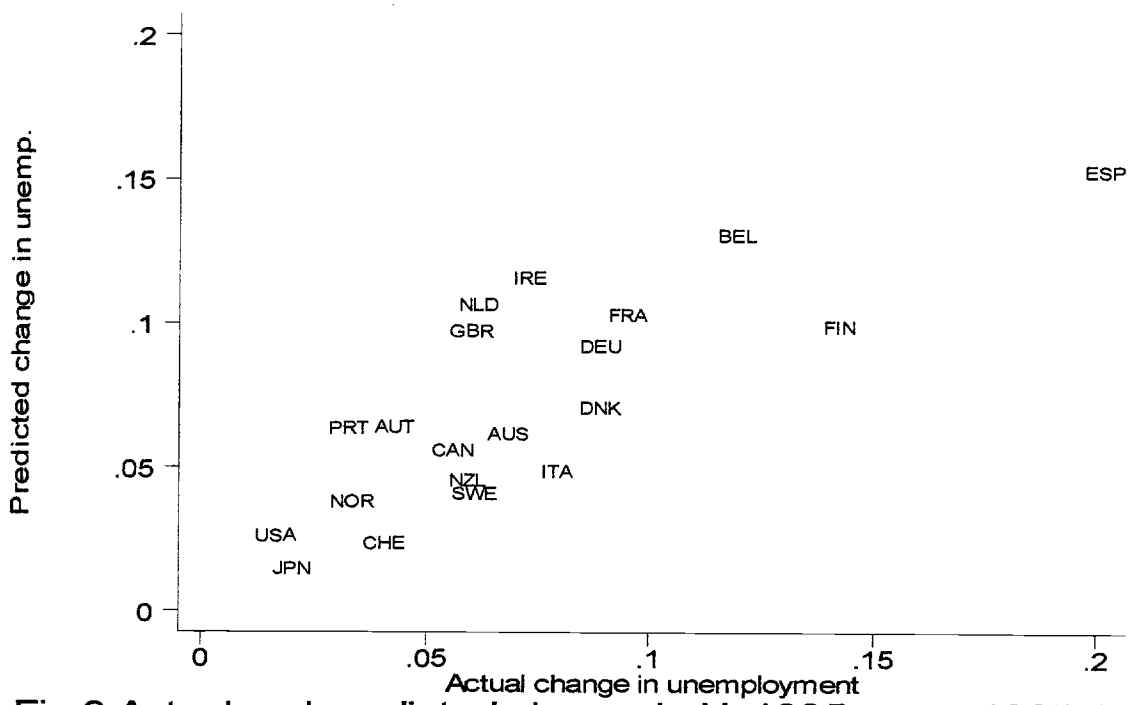

Fig 9 Actual and predicted change in U, 1995+ over 1965-69

shock on unemployment is roughly similar across institutions.

- Not only are the coefficients on institutions plausible, but the model does a good job of explaining the differential evolution of unemployment rates across countries. Fig 9 plots the change in the actual and the fitted unemployment rate from 1965-69 to 1995+. The fit is quite good. Interactions between common shocks and different institutions can account for much of the actual difference in the evolution of unemployment rates across countries. (Recall that a pure time effect model with no interactions would predict no variation in predicted unemployment rates across countries: all the points would lie on a horizontal line.)
- Another way of thinking about these results is as follows. Consider a model with unobservable shocks and unobservable institutions—equivalently a model with time, country, and interacted time and country effects:

$$u_{it} = c_i + d_t(1 + b_i) + e_{it} \qquad (1')$$

Equation (1) can then be thought of as imposing the restriction that b_i be a linear function of country i's institutions: $b_i = \sum X_{ij} b_j$. This raises the question of how much better we would do if we did not impose this restriction and estimated equation (1') instead. One way to answer the question is to look at two $\bar{R}^2$s. The $\bar{R}^2$ from estimation of (1') is 0.903, compared to 0.863 in Table 1. The $\bar{R}^2$ from a second stage regression of the estimated $\hat{b_i}$ on labor market institutions X_{ij}'s is 0.57. We read these results as saying that (1) the statistical description of the evolution of unemployment as the result between shocks and institutions has the potential to give a good description of the data (as reflected in the first stage $\bar{R}^2$), and that (2) labor market institutions do a good job of explaining country interaction effects (as reflected in the second stage $\bar{R}^2$).

In short, equation (1) gives a good description of the heterogeneity of unemploy-

ment evolutions as the result of interactions between shocks and institutions. These results are indeed consistent with the two cross sections estimated by Nickell, and show that his results are robust both to the use of a longer time period and the introduction of country effects.[22]

One must worry however that these results are in part the result of research Darwinism. The measures used by Nickell have all been constructed ex-post facto, by researchers who were not unaware of unemployment developments. When constructing a measure of employment protection for Spain, it is hard to forget that unemployment in Spain is very high... Also, given the complexity in measuring institutions, measures which do well in explaining unemployment have survived better than those that did not. Thus, in the rest of the section, we look at robustness.

Dropping institutions, countries, or country fixed effects

To give a sense of robustness with respect to the set of institutions, column (1) in Table 2 reports the results of 8 separate regressions, each regression allowing interactions with only one of the 8 measures for institutions. When introduced on their own, three measures are highly significant: the length of benefits, the degree of employment protection, and the degree of union coverage (which is insignificant in the multivariate specification). In contrast, the replacement rate, which is highly significant in the multivariate specification, is insignificant when introduced alone. Another strategy is to see what happens when we drop one institution at a time. The results (not reported) indicate that the coefficients reported in Table 1 are robust to such a variation.

Second, we look at robustness with respect to the set of countries. In general,

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22. There are however some differences between estimated coefficients. In particular: Employment protection is significant here, not in Nickell. Union contract coverage is not significant here, but is significant in Nickell.

Table 2. Time effects interacted with fixed institutions. Alternative specifications.

	(1) Institutions entered individually	(2) No Country effects
Time effects		7.1%
RR	0.004 (1.0)	0.017 (4.1)
Ben	0.268 (6.6)	0.213 (4.1)
ALMP	0.007 (1.4)	0.017 (2.4)
EP	0.043 (4.0)	0.049 (2.8)
Tax	0.012 (2.2)	0.017 (2.4)
Cov	0.532 (4.9)	0.049 (0.2)
Dens	–0.002 (–0.5)	0.009 (1.8)
Coor	0.048 (1.1)	0.301 (4.3)
CE	yes	no
$\bar{R}^2$		0.797

Column (1): each coefficient is estimated using a different regression, allowing interactions between the time effects and the specific institution variable. Column (2): Levels of institutional measures entered, but coefficients not reported. Number of observations: 159.

dropping one country at a time makes little difference to the results (not reported here). The only exception is the importance of Spain in determining the coefficient on employment protection. When dropping Spain, the coefficient on employment protection goes from 0.045 in Table 1 to 0.015.

Third, we look at robustness with respect to the treatment of country effects. Column (2) in Table 2 reports the results of estimation of equation (1), replacing country effects by the set of (time invariant) measures of labor market institutions for each country. That is, it imposes the constraint that all differences in unemployment rates be explained by differences in institutions; such a constraint is surely too strong, but it is worth seeing how it affects the results. Only the coefficients on interactions are reported in column (2). They are roughly the same as in Table 1. The coefficients on the levels of the labor market institutions (not reported) are typically insignificant. The fit is significantly worse than in Table 1.

Looking at alternative measures of institutions

Table 3 looks at the implications of using alternative measures for some of the institutions. This is the work–in–progress part of our article. Our goal is eventually to construct time series for all 8 institutions. So far, we have done so only for replacement rates and for employment protection. Columns (1) and (2) report our results using alternative measures for replacement rates. Columns (3) and (4) report our results using alternative measures for employment protection.

Using the OECD database on replacement rates for each country since 1961, we construct an alternative set of measures for the generosity of unemployment insurance. The first measure, RR1, is the replacement rate during the first year of an unemployment spell, averaged over all categories. The second, RR25, is the average replacement rate during years 2 to 5 of an unemployment spell, averaged over all categories.

Column (1) shows the results of estimation using time invariant values for RR1

Table 3. Time effects interacted with institutions. Alternative measures

	(1) Alternative replacement rates	(2) Time varying replacement rates	(3) Alternative employment protection	(4) Time varying employment protection
Time effects	7.3%	6.2%	7.3%	7.1%
(N) RR			0.017 (5.2)	0.017 (4.7)
(N) Ben			0.238 (5.6)	0.205 (4.4)
(Alt) RR1	0.009 (2.6)	0.007 (2.0)		
(Alt) RR25	0.009 (1.4)	0.019 (2.7)		
(N) ALMP	0.014 (1.6)	0.005 (0.5)	0.019 (3.2)	0.017 (2.6)
(N) EP	0.024 (1.4)	0.032 (1.7)		
(Alt) EP			0.294 (4.3)	0.167 (2.2)
(N) Tax	0.016 (2.4)	0.015 (2.1)	0.019 (3.5)	0.021 (3.7)
(N) Cov	0.413 (2.1)	0.395 (1.9)	0.085 (0.5)	0.287 (1.8)
(N) Dens	0.004 (0.8)	0.000 (0.0)	0.010 (2.5)	0.008 (1.7)
(N) Coor	0.272 (4.9)	0.325 (4.5)	0.392 (6.5)	0.361 (5.3)
CE	yes	yes	yes	yes
$\bar{R}^2$	0.824	0.831	0.872	0.857

(N) means Nickell measure. Column (1): estimation using time–invariant values of RR1 and RR25, equal to their average values for 1985-1990. Column (2): estimation using the time series for RR1 and RR25. Column (3): estimation using the value of EP for the late 1980s. Column (4): estimation using the time series for EP. Number of observations: 159.

and RR25. For comparisons with the results using Nickell's measures which apply to the late 1980s and early 1990s, we use the mean value of the two replacement rates for the period 1985–1989. Measures for the other 6 institutions are the same as in Table 1. The fit is a bit worse than in Table 1. The two replacement rates are both individually significant, and jointly highly significant. Coefficients on the other labor market institutions are often less significant than in Table 1. In particular, the coefficient on employment protection is smaller, and less significant.

Column (2) shows the results of estimation using time–varying measures for RR1 and RR25. Relative to column (1), the fit, measured by $\bar{R}^2$, is marginally improved (but is still worse than in Table 1). The part of the increase in unemployment due to time effects decreases from 7.3% to 6.2%. Coefficients on labor market institutions are largely the same as in column (1).

Columns (3) and (4) use the index of employment protection discussed in Section 2. In contrast to the Nickell index, which is a ranking of countries and thus ranges from 1 to 20, this index is a cardinal index, ranging theoretically from 0 to 6, empirically from 0 to about 4. Thus, in comparing coefficients to those obtained using the Nickell specification, keep in mind that the coefficients should be about 5 times larger to generate the same effect on unemployment.

Column (3) shows the results of estimation using time–invariant values of the index, equal to its value for 1985–1989. The results are very similar to Table 1. $\bar{R}^2$ is a little higher. The effect of employment protection is similar in magnitude to that in Table 1 (i.e the coefficient is about 5 times larger), and highly significant.

Column (4) shows the results of estimation using the time varying values of the employment protection index. Allowing for time variation does not improve the results: $\bar{R}^2$ is slightly lower. The coefficient on the employment protection index decreases by nearly half and becomes less significant. These results can be read in three ways. First, the effects of employment protection are indeed less strong than suggested by previous regressions using time–invariant measures. Two, the time

series we have constructed for employment protection are not very reliable; as we discussed in Section 2, we are worried about the evolution of the index in the early part of the sample. Three, our earlier and apparently stronger results come in fact from reverse causality. Under this interpretation, the rise in unemployment has led over time to more employment protection, which is why there is a close relation between employment protection at the end of the sample and unemployment. But employment protection has little effect on unemployment, which is why the relation is weaker when using time series. Given the lack of strong evidence about the presence of a strong and reliable feedback from unemployment to institutions, we are skeptical; but we cannot exclude this interpretation.

To conclude: A model with common unobservable shocks and interactions with institutions provides a good description of the evolution of unemployment rates across time and countries. The description appears reasonably robust—although less so with respect to time variation in institutions. This conclusion leaves open the issue of what these shocks might have been, and whether they have indeed been similar across countries. For this reason, we now turn to a specification based on observable shocks.

5 Country specific observable shocks, and interactions

The benchmark specification we use in this section is the following:

$$u_{it} = c_i + (\sum_k Y_{kit} a_k)\,(1 + \sum_j X_{ij} b_j) + e_{it} \qquad (2)$$

where the notation is the same as before, but the unobservable common shocks of section 3 are now replaced by a set of country specific shocks; Y_{kit} denotes shock k for country i in period t.[23] gain, our benchmark relies on time invariant

23. Most theories predict that the interaction of institutions and shocks may be different for different

measures of institutions, thus the lack of an index t for X. Later on, we look at results allowing for time variation for institutions.)

Following the discussion in Section 2, we consider three sources of shocks and construct three variables for each country and each period. They are the rate of TFP growth, the real rate of interest, and the labor demand shift measure, respectively. We enter them as levels, but, given the presence of country dummies in the regression, they can be thought of as deviations from country averages—or from their 1960 values. To make it easy to read the tables, each variable is measured so an increase is expected to increase unemployment initially; therefore the original measure of TFP growth is multiplied by –1. Due to some missing data for some countries, the panel is (slightly) unbalanced. Also, one observation requires special treatment. As discussed in Blanchard [1997], the Portuguese revolution was associated with a large permanent increase in the measured labor share (20% of GDP)—without a corresponding increase in unemployment. While this evolution is interesting in its own right, we have decided to ignore it by allowing for a dummy for Portugal, from 1960 to 1974.[24]

The natural first question is: Ignoring differences in institutions across countries, how much of the evolutions of unemployment across time and countries can be explained by our three shocks? The answer is given in Table 4 and in Fig 10.

Column 1 in Table 4 presents regressions of the unemployment rate on the three shocks, leaving institutions out. Two of the three shocks (TFP growth, and the real interest rate) are significant. A decrease in TFP growth of 3 percentage points, as has happened in many countries, translates into an increase in the unemployment

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shocks. But allowing for different interactions between each shock and each institution struck us as asking too much from our limited data set (131 data points for the regressions in this section).

24. The difference between macro and labor panel data regressions is that, in macro, each data point is intimately known by the researcher...

Table 4. Shocks only.

Dependent var	(1) u	(2) u^* sacrifice ratio=2.0	(3) u^* sacrifice ratio=4.0
TFP growth	0.47 (3.1)	0.36 (2.6)	0.25 (1.7)
Real rate	0.67 (5.6)	0.63 (6.1)	0.63 (6.1)
LD shift	0.07 (1.1)	0.08 (1.5)	0.09 (1.7)
CE	yes	yes	yes
$\bar{R}^2$	0.566	0.590	0.584

Number of observations: 131

Fig 10 Actual & Predicted Change in U, 1965-69 to 1990-94

rate of about 1.5%. An increase in the real interest rate of 5 percentage points leads to an increase in the unemployment rate of 3%. A decrease in the adjusted labor share of 10 percentage points, such as happened in France and in Spain since the mid 1980s, leads to an increase in the unemployment rate of about 1%. So, these shocks appear indeed to explain part of the evolution of the unemployment rate across time and countries.

Do differences in the magnitude of shocks explain the cross country heterogeneity in unemployment increases? The answer, as shown in Fig 10 is no. The figure plots the change in fitted unemployment against the change in actual unemployment from 1965-1969 to 1990-1994 (this is the longest time span for which data are available for all countries.). The relation is positive, but poor. The Netherlands and Spain have the same predicted increase in unemployment, yet very different outcomes. In short, the heterogeneity of shocks cannot account for much of the heterogeneity of unemployment evolutions.

Columns (2) and (3) in Table 4 present a rough attempt to adjust unemployment for deviations of actual from equilibrium unemployment. We start from the assumption that the following "Phillips curve" relation holds between the change in inflation, the actual and the equilibrium rate of unemployment:

$$\Delta\pi_{it} = -a\,(u_{it} - u^*_{it})$$

We then construct "equilibrium unemployment" as $u^*_{it} = u_{it} + (1/a)\Delta\pi_{it}$; $1/a$ is often called the sacrifice ratio. Estimates of a for Europe for annual data typically range from 0.25 to 0.50.[25] Column (2) constructs u^* using a sacrifice ratio of 2.0;

25. If our approach to measuring the equilibrium unemployment rate is right however, then most existing estimates of a, which rely on a much rougher measure of equilibrium unemployment, are not right. We did not take up the task of estimating a in this article.

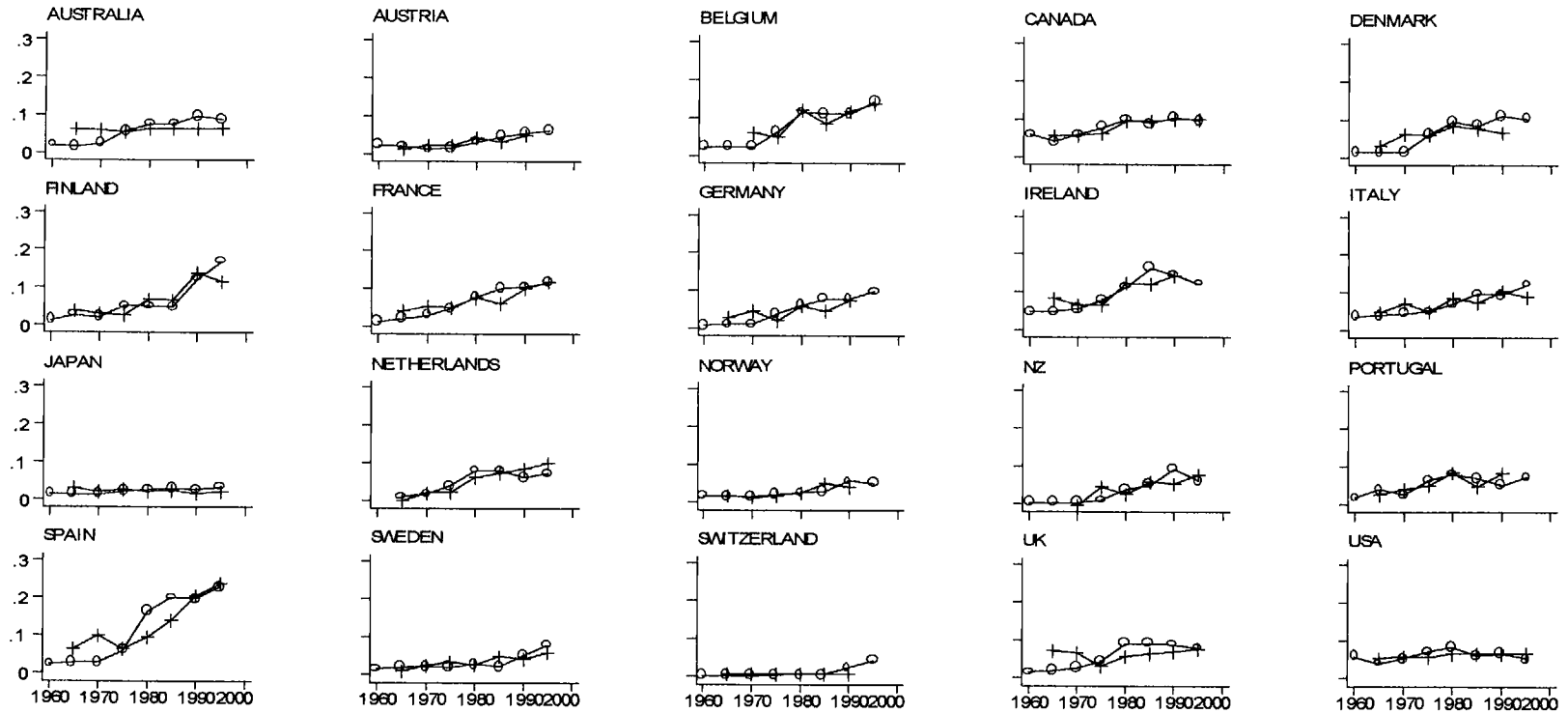
Table 5. Shocks interacted with fixed institutions.

	(1) Benchmark equation	(2) Institutions entered individually	(3) u^* sacrifice ratio=2.0
TFP growth	0.71 (5.0)		0.58 (4.5)
Real rate	0.47 (5.1)		0.49 (5.7)
LD shift	0.19 (2.7)		0.15 (2.4)
RR	0.025 (3.7)	0.013 (2.4)	0.025 (3.7)
Ben	0.267 (3.0)	0.203 (2.3)	0.313 (3.3)
ALMP	0.028 (1.4)	–0.009 (-0.7)	0.033 (1.6)
EP	0.095 (2.7)	0.047 (2.7)	0.090 (2.6)
Tax	0.033 (2.4)	0.026 (2.6)	0.037 (2.6)
Cov	–0.501 (-1.1)	0.639 (3.0)	–0.466 (–1.0)
Dens	0.033 (3.2)	–0.002 (–0.3)	0.033 (2.8)
Coor	0.414 (2.9)	–0.039 (–0.4)	0.439 (2.9)
CE	yes	yes	yes
$\bar{R}^2$	0.674		0.702

Number of observations: 131

Fig 11 Actual & Predicted Change in U, 1965-60 to 1990-94

Observable Shocks; Interacted with Fixed Institutions



period

Fig 12 Actual (o) and Predicted (+) Unemployment Rates

column (3) does the same using a ratio of 4.0.[26] The fit in columns (2) and (3) is better than in column (1)—the dependent variable is not the same however. The effects of each of the three shock variables are roughly similar.

Table 5 presents the results of the specification that allows for both shocks and interactions with institutions. Column (1) presents the results from estimating the benchmark specification (2).

All three variables measuring shocks are now very significant. The effects of TFP growth and the labor demand shift are larger than in Table 4, the effects of the real interest rate slightly smaller. A decrease in TFP growth of 3 percentage points translates into an increase in the unemployment rate of about 2%. An increase in the real interest rate of 5 percentage points leads to an increase in the unemployment rate of 2.5%. A decrease in the adjusted labor share of 10 percentage points leads to an increase in the unemployment rate of about 2%.

Coefficients on 7 of 8 institutions have the expected sign. Only union coverage is negative, but insignificant. The most significant coefficients are on the replacement rate, the length of benefits, union density and coordination. Except for union coverage, the pattern of coefficients is the same as in Table 1 (estimated with unobservable shocks), up to a factor of proportionality greater than 1. That is, they are in general 1.5 to 2 times larger than in Table 1. The mechanical explanation is that the observable shocks explain less of the general increase in unemployment, and the interactions must therefore explain more. The $\bar{R}^2$ is much lower than in Table 1: Despite the fact that they can differ across countries, the 3 observable shocks do not do as good a job as the set of 8 time effects in Table 1.

The specification does a good job of explaining differences in unemployment evolutions across countries. This is shown in Fig 11, which plots the change in fitted

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26. In doing so, we are implicitly assuming that the sacrifice ratio is not related to institutions. This is probably incorrect.

unemployment against the change in actual unemployment, from 1965-1969 to 1990-1994. The fit is quite good; clearly much better than in Fig 10, if not quite as good as in Fig 9. Fig 12 gives another way of looking at fit, by plotting the actual and fitted unemployment rate for each of the 20 countries over time. The visual impression is one of a good fit in nearly all cases. (To facilitate comparison of unemployment rates across countries, the vertical scale is the same for all countries. The drawback is that it is harder to assess the fit for each country.)

Column (2) looks at the effects of entering institutions one at a time. The conclusions are largely similar to those in the previous section. In particular, union coverage is very significant on its own, but not in combination with other institutions. Column (3) replaces actual by equilibrium unemployment, assuming a sacrifice ratio of 2.0. The fit is better, but the results are otherwise very similar.

Table 6 looks at alternative measures of institutions. Its structure is the same as that of Table 3. Columns (1) and (2) look at the effects of using the two measures of replacement rates using OECD data. Column (1) uses a time invariant value equal to the average for 1985-1989; column (2) uses the time series. Columns (3) and (4) do the same for employment protection. The table suggests two conclusions, both worrisome: Replacing the Nickell measures by alternative, but time invariant measures, substantially decreases the $\bar{R}^2$. Going from the time invariant to the time varying measures further decreases the fit. The coefficients on institutions remain consistently positive, but are typically smaller than in Table 5, and less significant. These results lead to the same discussion as in Section 3: Luck, or data mining, when the standard set of measures is used? Poor time series for institutions, interacting here with the fact that we are looking at their product with time varying and also imperfectly measured shocks? Or reverse causality (although the fact that the deterioration of fit happens when replacing one time invariant measure by another is not supportive of this hypothesis).

To conclude: One can indeed give a good account of the evolution of unemployment across countries and times by relying on observable shocks and interactions

with labor market institutions. The fact that the results are weaker when using time varying institutions is worrying. But, again, the results strike us as surprisingly good overall.

6 Conclusions

We see our results as preliminary. We see our dynamic specification of the effects of shocks as much too crude. We still need to construct and introduce time series for some labor market institutions. We worry about the endogeneity of labor market institutions. Nevertheless, we believe that the results so far suggest that an account of the evolution of unemployment based on the interaction of shocks and institutions can do a good job of fitting the evolution of European unemployment, both over time and across countries.

If our account is correct, one can be mildly optimistic about the future of European unemployment. The effects of some of the adverse shocks should go away. The real interest rate is likely to be lower in the future than in the recent past. The dynamic effects of what we have identified as adverse labor demand shifts should eventually prove favorable to employment. Institutions are also slowly becoming employment–friendly. Our results suggest that the more favorable macroeconomic environment and the improvement in institutions should lead to a substantial decline in unemployment.

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