

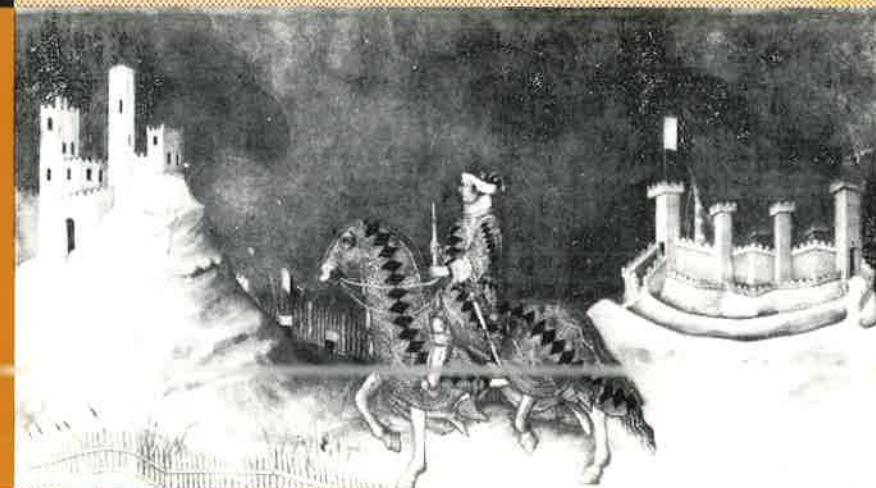
UNIVERSITÀ DEGLI STUDI DI SIENA



QUADERNI DEL DIPARTIMENTO
DI ECONOMIA POLITICA

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**UNEMPLOYMENT COMPONENTS
IN THE G7 COUNTRIES**



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DI ECONOMIA POLITICA**

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by

Riccardo Fiorito and Flavio Padrini

1. INTRODUCTION.

The increase in unemployment rates since the mid-70s stimulated a number of studies to clarify why this was a widespread phenomenon everywhere but especially in Europe. Alongside deep changes in macroeconomics, supply shocks were introduced to account for the possibility that prices could act countercyclically. Hence, unemployment changes were broken down into 'classical' or 'keynesian' determinants, it being widely recognized that both sides could account for a larger portion of variance than aggregate demand alone.

However, in several cases shocks are typically confined to the good market as we find in the 'real wage gap' literature (Sachs, 1983; Bruno-Sachs, 1985) and in a stream of studies that implicitly equate unemployment with negative employment by paying little or no attention to labor force growth (Bean-Layard-Nickell, 1986; Layard-Nickell-Jackman, 1991). Of course, this presumption is unfortunate since unemployment changes are not a mirror image of employment changes as long as the labor force grows. This flaw also characterizes theoretical surveys (Bean, 1991) which are at best incomplete in their coverage.

In empirical work decompositions of unemployment by sources that do not include labor supply cannot but be biased and largely irrelevant to policy goals because the difficulties of cutting unemployment whenever labor force increases (or at least is procyclical) are severely underestimated.⁽¹⁾

A possible exception to this disregard of labor supply is

¹ This is shown by simulation in a regional model for Italy (Baussola-Fiorito, 1992).

the study by Rowthorn and Glyn (1990) who break down OECD unemployment changes by labor force and employment components. They show that increase in unemployment changes, while often country- or area-specific, are never related to a single dominant source.

Our study is much in the same vein as that of R&G though our sample is confined to the G7 subset. Our decomposition, however, allows us to address a number of issues ignored by R&G since employment changes were considered as given and the labor force was broken down solely in terms of participation rate and working age population. We instead decompose employment changes in terms of real GDP and productivity in order to approximate typical 'keynesian' and 'classical' sources of unemployment. Moreover, as far as the labor force is concerned, we also account for the working age population share which is a policy variable inasmuch as it is affected by compulsory education and mandatory retirement ceilings.

Our main result is not different from that of R&G since we too find that the increase in unemployment rate corresponds to a combination of labor supply decisions, cyclical factors and demographic changes. We show, however, that as long as cyclical factors are measured by real GDP changes, they account for around 1/3 of unemployment rate changes: thus unemployment rate is not (especially in Europe or Japan) a reliable indicator of macro-economic performance. The claim that the rise in unemployment rates in major OECD countries have been unaffected by labor force components is empirically untenable even for those countries (Germany and UK) where unemployment and employment are more closely correlated.

A second result of our study is that the typical US/Europe comparisons of labor markets (Blanchard-Summers, 1986) may obscure the fact that European labor markets do not follow a single path but reflect major differences at the business cycle frequencies (Fiorito-Kollintzas, 1992).

Our conclusions are based on (unconditionally) decomposing

the unemployment rate changes in the 1961-89 period and in two subperiods (1961-73 and 1974-89), thus accounting for possible structural breaks in productivity and participation rates. The paper is organized as follows: Introduction, Section 2 which posits the methodology; Section 3 which reports a few stylized facts on unemployment rate and its components in the relevant samples. The decomposition results are discussed in Section 4. Section 5 concludes.

2. METHODOLOGY

The standard definition of unemployment amounts to the imbalance between labor supply and labor demand in terms of workers:

$$(1) \quad U_t = LF_t - E_t$$

where - for the sake of simplicity - labor supply and labor demand are approximated respectively by the observed labor force (LF) and employment (E)(2). In fact, data on labor supply in terms of hours are not simply more difficult to obtain and subject to measurement error - especially for services and the self employed - but also inevitably raise the question whether observed hours denote supply or demand for labor.

Labor force can be decomposed as the product of participation rate (LF/POPW) and the share of the working age population over total population (POPW/POP) by the population stock (POP):

2 More details on data definitions can be found in: ILO, Resolution I of the 13th International Conference of Labour Statisticians, Geneva, October, 1982.

$$(2) \quad LF_t = \frac{LF_t}{POP_t} * \frac{POP_t}{POP_t} * POP_t$$

Participation rates shape labor force changes in different ways (Mincer, 1985): typically younger males and females exhibit highly variable participation rates while adult males display an attachment to the labor market which is too uniform to account for the observed variability in participation rates.

As already mentioned, alongside pure demographic factors (population) in Eq. 2 we also introduce the share of working population over total population to account for country-specific features of labor markets such as mandatory school and retirement ceilings.

Total employment can be expressed as the ratio of output (Y) to labor productivity ($\pi=Y/E$). Assuming separability between output and value added, the first can be replaced in the aggregate by real GDP yielding:

$$(3) \quad E_t = \frac{Y_t}{\pi_t}$$

By differentiating the unemployment rate (UR)

$$(4) \quad UR_t = 1 - \frac{E_t}{LF_t}$$

with respect to time we obtain:

$$(5) \quad \frac{dUR(t)}{dt} = \frac{E(t)}{LF(t)} \left[\frac{d \ln LF(t)}{dt} - \frac{d \ln E(t)}{dt} \right]$$

This corresponds in discrete time to the approximate relation:

$$(6) \quad UR_t - UR_{t-1} = \frac{E_t}{LF_t} (LF_t - \dot{E}_t)$$

where changes in unemployment rate are expressed as the employment/labor force ratio times the difference between the rates of change of labor force and employment. Equation (6) shows that unemployment changes are the negative of employment changes only in the special case:

$$(7) \quad UR_t - UR_{t-1} = -\dot{E}_t$$

where the ratio of employment to labor force is one or very close to one (frictional unemployment) and - more important - when labor force is constant.

By inserting in equation (6) the percentage changes of equations (2)-(3) we obtain an approximate expression for the changes in unemployment rate:

$$(8) \quad UR_t - UR_{t-1} = \frac{E_t}{LF_t} \left[\left(\frac{LF_t}{POP_t} \right) + \left(\frac{POP_t}{POP_t} \right) + POP_t - \dot{Y}_t + \dot{\pi}_t \right]$$

which shows that unemployment is decreased by expanding real GDP and increased by higher participation rates, population and productivity growth. If factors are paid at the marginal product,

unemployment is increased by higher real wages too.

For measurement purposes, equation (8) is rewritten as:

$$(9) \quad UR_t - UR_{t-1} = \sum_{i=1}^5 X_{it} + \theta_t$$

where X_i stands for the product of the employment/labor force ratio and any element of the decomposition while e denotes a residual term due to the discrete approximation of continuous time variables. Finally, we have calculated for each period and then averaged in Table 5 the following weights which correspond to the fraction of unemployment rate changes accounted for by any element in Eq.8:

$$(10) \quad w_{it} = (|X_{it}| / \sum_{i=1}^5 |X_{it}|) * 100$$

where $|X_i|$ is the absolute value of the appropriate variable X_i . The source of the real GDP is OECD, National Accounts. 1960-89, Paris, 1991. The time series for unemployment, labor force, employment, working age population and total population stem from OECD, Labor Force Statistics, Paris, several years. We did not use the OECD standardised unemployment rates because these would be inconsistent with our decomposition. Yet, since official and standardized unemployment rates are in the G7 countries highly correlated results would remain unaffected whatever the measure used.

3. Stylized facts

Table 1 reports that before 1980 unemployment rates were generally lower in Europe than in the US and Canada. After 1980 the picture is reversed and Canada widens its gap with the US.

A second basic fact shown in Table 1 is that unemployment rates after 1973 rise everywhere, though at different speeds. Further, unemployment rates - not differently from unemployment levels - look non-stationary despite the fact that they are deflated by an increasing labor force. Formal tests indicate that unemployment rates are 'mildly' non-stationary in the US and 'strongly' non-stationary in Europe (3). This is also true for Japan though its unemployment rate is too low for comparison with the others.

Table 1 - Mean and Volatility of Unemployment Rate in G7 (4)

	US		CAN		J		D		F		UK		I	
Period	M	V	M	V	M	V	M	V	M	V	M	V	M	V
61-89	6.1	0.3	7.0	0.3	1.8	0.3	3.9	0.8	4.9	0.7	4.8	0.7	7.2	0.3
61-73	4.9	0.2	5.3	0.2	1.3	0.1	1.0	0.4	1.9	0.3	2.1	0.2	5.4	0.1
74-80	6.8	0.1	7.2	0.1	1.9	0.1	4.1	0.2	4.9	0.2	4.1	0.3	6.8	0.1
80-89	7.3	0.2	9.3	0.2	2.5	0.1	7.9	0.2	9.1	0.1	9.1	0.2	10.2	0.1

A third fact shown in Table 1 is that unemployment increase is not characterized by higher volatility. On the contrary, in all G7 countries the growth of real GDP declines and becomes more volatile after 1973.

Looking at the components, however, one can see (Table 2) that unemployment rates rose more in Europe despite the fact that labor force and population growth were considerably lower than in North America. Indeed, in the US labor force was growing at about

3 The relevant ADF(4) tests (Sample: 1961:1 1989:4; France: 1968:1 1989:4) show that unemployment rates are everywhere non-stationary even though this tendency is stronger in Italy, Japan and Germany and weaker in the US and UK: Canada (-1.26); US (-1.71); Japan (-0.87); Germany (-1.08); France (-1.11); UK (-1.59); Italy (-.28).

4 Vol denotes volatility (standard deviation + sample mean). Here and henceforth: US = United States, Can = Canada, J = Japan, D = West Germany, F = France, UK = United Kingdom, I = Italy.

a 2% annual rate and even more so in Canada before it declined after 1973.

Table 2 - AVERAGE (%) CHANGES IN UNEMPLOYMENT RATE AND ITS COMPONENTS (5)

		US	CAN	J	D	F	UK	I
UNEMPLOYMENT RATE	1961-89	-.01	.03	.02	.20	.28	.16	.22
	1961-73	-.05	-.07	-.03	.00	.11	.06	.06
	1974-89	.02	.12	.06	.37	.43	.25	.36
LABOR FORCE	1961-89	1.99	2.55	1.14	.36	.81	.55	.32
	1961-73	1.93	2.78	1.28	.13	1.00	.40	-.43
	1974-89	2.04	2.35	1.02	.57	.64	.69	.97
PARTICIPATION RATE	1961-89	.54	.72	-.13	-.11	-.12	.22	-.30
	1961-73	.25	.54	-.42	-.23	-.06	.16	-.98
	1974-89	.80	.87	.13	-.01	-.18	.28	.29
WORKING AGE POPULATION	1961-89	1.45	1.83	1.27	.48	.93	.31	.61
	1961-73	1.68	2.23	1.70	.36	1.06	.24	.55
	1974-89	1.24	1.48	.88	.58	.82	.40	.67
POPULATION	1961-89	1.11	1.32	.97	.39	.72	.30	.52
	1961-73	1.23	1.60	1.18	.84	1.01	.54	.74
	1974-89	1.00	1.08	.78	.00	.47	.11	.33
EMPLOYMENT	1961-89	1.99	2.51	1.12	.16	.51	.39	.07
	1961-73	1.98	2.86	1.31	.13	.89	.34	-.49
	1974-89	2.01	2.21	.96	.19	.18	.43	.57
REAL GROSS DOMESTIC PRODUCT	1961-89	3.20	4.30	6.33	3.05	3.67	3.00	3.43
	1961-73	3.87	5.30	9.17	4.28	5.24	3.12	5.13
	1974-89	2.63	3.43	3.86	1.98	2.31	2.91	1.96
LABOR PRODUCTIVITY	1961-89	1.22	1.78	5.21	2.89	3.16	2.12	3.86
	1961-73	1.90	2.44	7.86	4.15	4.35	2.79	5.62
	1974-89	.62	1.21	2.91	1.79	2.12	1.53	2.33

In Europe labor force growth was consistently smaller, different over time and from country to country. In the US and Canada participation rates always increased but fell in Japan in 1960-73 as they did in Europe with the exception of the UK. Post-

5 Data for unemployment rate are absolute differences.

1974 participation rate rose more in the US and Canada. In Europe participation rates are stationary in Germany, decrease in France and increase in Italy and the UK.

Population growth is also higher in Canada and in the US whereas in this case Japan seems to be an intermediate case between North-America and Europe. After 1973 population growth decreases everywhere. This implies an average rate for the US and Canada of around 1% while in Europe - and especially in Germany - the relevant figure is close to zero. Thus, European countries differ more in terms of participation rates than in terms of demographic patterns which are roughly similar.

The working age population in North America is also higher and declining after 1973 while in Europe there is no clear-cut pattern: after 1973 the working age population falls in France while rising in Germany, UK and Italy. In all cases, however, the working age share over total population rises after 1973 as we can see by comparing their relative growth rates. It is therefore important to appraise in Table 3 the net job creation rate, i.e. the difference between the rate of growth of employment and the rate of growth of the working age population, the latter corresponding to the number of extra jobs required by demographic expansion (Blanchard et al., 1985).

Table 3 - NET JOB CREATION RATES (% CHANGES)

	US	CAN	J	D	F	UK	I
1961-89	.54	.68	-.30	-.32	-.42	.08	-.54
1961-73	.30	.63	-.52	-.23	-.17	.10	-1.04
1974-89	.77	.73	-.10	-.39	-.64	.03	-.10

Employment growth is lower in Europe especially if compared with the US and Canada. However, Europe and Japan do not differ in terms of employment rates or job creation. This implies that job creation in Japan and Europe - with the possible exception of the UK - is not simply smaller in absolute terms but is also insufficient to meet demographic requirements. In France and Germany the employment gap increases after 1973 while surpluses

increase in the US and Canada.

The supply shocks of the 70s reduced the potential for growth in all countries and especially in Japan where economic growth had been previously spectacular. After 1973, however, GDP growth declines everywhere but employment responses to output differ from country to country as we can see from Table 2. Implied elasticities of labor demand to output are still very low in Europe and Japan while they are notably higher in the US and Canada where labor markets are much less regulated (Emerson, 1988). Indeed, flexibility in labor markets is not just reflected by the real wage response to business cycle conditions (Sachs, 1979) but is also signalled by the magnitude of labor response to output change and, in particular, by the relative variability and timing of labor adjustment over the business cycle.

In this respect industry data and measures of relative variability between cyclical employment and output indicate, especially in Europe and Japan, that labor hoarding occurs (Fiorito-Kollintzas, 1992). This implies that the growth required *ceteris paribus* to increase employment is generally higher than can be sustained by countries facing severe external trade or inflation constraints. Needless to say, reduction of unemployment is even more difficult or costly when both labor hoarding and rising labor forces occur.

Pre- and post-1973 employment growth in Europe is scanty and thereafter reflects also the decline in the activity level. In Italy and UK, however, the job creation rate is after 1973 higher than before. For the UK one has to consider that GDP growth rate was not strongly reduced over time while in Italy higher employment results from declining productivity growth, albeit the highest in Europe. By comparing the two periods in terms of net job creation (Table 2) it also appears that Italy is the only European country where this indicator, though negative, improves while the UK is the only European country where the number of new available jobs exceeds demographic requirements.

Table 4 - Nominal and Real Wage Growth (6)

	US	CAN	J	D	F	UK	I
Wages							
1961-89	5.43	7.38	9.98	6.97	10.15	11.23	13.63
1961-73	4.62	6.28	13.46	8.98	9.20	8.99	10.96
1974-89	6.09	8.28	7.18	5.34	10.92	12.63	15.7
Prices							
1961-89	5.08	5.59	5.08	4.01	6.79	8.87	9.30
1961-73	3.64	3.81	6.02	4.41	4.53	5.76	4.68
1974-89	6.25	7.04	4.30	3.68	8.63	10.82	13.05
Real Wages							
1961-89	0.35	1.80	4.90	2.96	3.36	2.36	4.33
1961-73	0.98	2.47	7.44	4.57	4.67	3.23	6.28
1974-89	-0.16	1.24	2.88	1.66	2.29	1.81	2.74

In all countries real wage and productivity growth are very close as can be seen from Tables 2 and 4. However, in the US productivity growth always exceeds real wage growth: after 1973, in particular, productivity growth declined, real wages fell and several jobs were created in small scale, low-paid, services. Conversely, in any other country real wage growth declines after the first oil shock but is still positive and highly correlated as before with growth in labor productivity. It is well-known that very few jobs were created in Europe where the gap between real wage and productivity growth was reduced everywhere, in Germany even becoming negative.

4. Results

From Table 5 it appears that in most cases labor force components account for about one half of the overall unemployment rate changes. In the US and Japan labor force and employment changes are balanced while in Europe there are large differences between the samples and countries: in the UK employment changes

6 Real wages are the ratio between earnings in manufacturing and GDP deflator. In Italy and France the variables are hourly rates in industry and CPI. Data for France range from 1964 to 1989.

always dominate labor force changes but this tendency is stronger after 1973 as it was in Germany. In France the opposite holds even though differences between labor supply and labor demand shares are reduced. Finally, Italy is the only case where the relative weights are reversed over time so that labor force components dominate the breakdown of unemployment after 1973.

One of the most important regularities in labor markets is that from the mid-70s participation rate rose everywhere and thereafter accounted for a larger share of the labor force and of unemployment rates in all countries. In particular, participation rates in the UK, Canada and especially Italy are very important in understanding the overall rise in unemployment rates.

Table 2 shows that for the same period population growth decreased along with its share of the labor force. Yet, while this demographic pattern is common to all countries, there is an important split in the working age share which rises in Europe and falls in North America and Japan. This is reflected in Table 5 where we can see that changes in the working age population have a much smaller impact in North America than in Europe.

In Italy changes in working age population and changes in participation rates constitute after 1973 the two most important sources of unemployment changes. In Germany too these variables have about the same weight but they account for unemployment changes less than employment components do. In the other cases the relative weights between participation rates and working age population are different or quite different as in the US and in Canada where changes in the working age population are a minor source of the rise in unemployment rates after 1973. In this case too Japan can be placed midway between Europe and North America.

Changes in population account more for unemployment rate changes in the US and in Japan than in Europe with the exception of France: after 1973 France is the only European country where productivity/real wage changes have about the same weight as population changes, while before 1973 population seems to be in France the most important source of unemployment increase.

TABLE 5. PERCENTAGE DECOMPOSITION OF UNEMPLOYMENT RATE CHANGES

		US	CAN	J	D	F	UK	I
PARTICIPATION RATE	61-89	14.1	15.7	12.4	13.2	13.3	16.8	21.6
	61-73	9.7	9.2	10.8	9.9	10.5	11.9	18.6
	74-89	17.6	20.5	13.7	15.2	15.5	20.3	23.4
WORKING AGE POPULATION SHARE	61-89	9.6	8.6	11.4	15.3	10.6	13.2	14.3
	61-73	12.4	11.6	12.4	14.1	7.0	12.2	5.9
	74-89	7.3	6.2	10.6	15.8	13.4	14.0	23.4
POPULATION	61-89	26.8	23.6	26.8	15.3	30.6	12.1	17.6
	61-73	29.1	29.4	28.2	25.1	38.6	19.9	17.8
	74-89	25.0	19.3	25.7	8.7	24.4	6.3	15.8
REAL GROSS DOMESTIC PRODUCT	61-89	32.6	37.9	27.7	27.3	23.8	32.3	23.5
	61-73	31.3	34.8	26.3	24.7	24.0	30.6	27.1
	74-89	34.1	40.5	28.8	29.5	23.7	33.6	19.9
LABOR PRODUCTIVITY	61-89	16.9	14.2	21.6	28.9	21.7	25.6	23.0
	61-73	17.5	15.0	22.3	26.2	19.9	25.4	30.6
	74-89	16.0	13.5	21.0	30.8	23.0	25.8	17.5

Table 5 shows also that real GDP changes are in most cases the primary source of unemployment changes. This is reasonable and generally encouraging for macroeconomic policy making. However, our results also show that increasing real GDP is necessary though not sufficient to reduce the unemployment rate at least because real GDP shares are relatively higher but never large enough to dominate productivity or labor supply components. This conclusion applies even to those countries (Canada, US and UK) where real GDP ranks first: it accounts at most for 2/5 of the overall unemployment changes in Canada, about 1/3 in the US and the UK, something less than 1/3 in Japan and about 1/5 in France and Italy.

It is worthwhile noting that these shares are generally close to the 1/3 value implied by Okun's Law. However, in the light of our results Okun's Law should be reinterpreted as an indicator that several variables have been omitted in the unemployment/output relation rather than as a useful benchmark for analyzing labor demand [Aoki-Fiorito, 1992].

By again comparing major differences over time it appears that in France and particularly in Italy real GDP changes are less relevant than before in shaping unemployment rates. The opposite is found for the remaining countries where unemployment rates are more responsive to cyclical variables. If this be true, one can argue that after 1973 economic expansion was generally not sufficiently sustained to match labor market requirements. This applies particularly to Germany where both inflation rates and population growth were the smallest. Conversely, when unemployment rate is less responsive to output changes the GDP growth required to reduce labor market imbalances must be very high and cannot be maintained for long because of trade and nominal constraints.

Decomposition of employment in terms of real GDP and productivity shows that productivity changes matter more in Europe and in Japan, while output changes are relatively dominant in the US and Canada. This result seems to confirm the view that real wage rigidity plays a larger role in Europe than in the US even though our data are in this case more suggestive than conclusive. Much less controversial is the finding that after 1973 there is a fall in productivity shares in North America, Japan and Italy, a small increase in France and a large increase in Germany and in the UK. In Germany productivity changes account for almost 1/3 of the overall unemployment rate change: this also corresponds to a slightly larger quota than real GDP changes that are, however, still remarkable.

The breaking down in terms of unemployment rates (Table 5) confirms then the difference between Europe and the others but also reveals discrepancies between the two periods and within Europe that are often overlooked in the comparative literature.

5. CONCLUSIONS

We break down unemployment rate changes in the G7 countries using a variety of labor supply and labor demand components. In particular, we disentangle labor supply in terms of participation

rates, population and working age population shares. Employment is broken down in terms of real GDP and productivity changes, the latter being highly correlated with real wage changes everywhere.

Looking at the single countries we have the following findings:

- in the US and Japan labor supply and labor demand have about the same weight on the rise in unemployment rate.
- in Canada the growth of unemployment seems mainly associated with a slower growth of real GDP after 1973;
- in Europe, where the growth of the unemployment rates after 1973 is more pronounced, we note different patterns: in France none of the two components is predominant whereas in Germany and in the UK unemployment is mainly related to labor demand side. In Germany real GDP and productivity have about the same share after 1973, while unemployment in the UK reflects more the insufficient growth in real GDP and the role of real wages and participation rates. In Italy unemployment rates are related to rising participation rate and much less to real GDP changes.

In no case is there a dominant source. Real GDP generally ranks first but its share is about 1/3 of the overall unemployment change. This is not surprising if it is borne in mind that unemployment is not the negative of employment but is a two-sided process where both labor demand and labor supply are present and actually interact in a way that cannot be captured by our methodology. Despite this obvious limitation, we are confident that our descriptive results are nevertheless valuable. This holds in particular for the conclusion that participation rates generally matter and that differences between Europe and the US do not reflect real wages only but also differences in labor hoarding and in working age population.

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