How Do the Skilled and the Unskilled Respond to Regional Shocks?

The Case of Spain

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Are there any differences in how workers of different skill levels respond to regional shocks? This paper addresses that question using the methodology of Blanchard and Katz (1992) and a unique data set on working-age population, labor force, and employ-ment for five educational groups (ranging from the illiterate to the college-educated) over 1964–92 for the 50 Spanish provinces. The paper finds that the highly skilled migrate very promptly in response to a decline in regional labor demand, while low-skilled workers drop out of the labor force or stay unemployed. [JEL E24, J61]

When workers in a given region lose their jobs, do they remain unemployed, drop out of the labor force, or migrate? In other words, what are the mechanisms of adjustment to local labor demand shocks? Existing studies, beginning with the seminal paper by Blanchard and Katz (1992) on the 50 U.S. states, and including those by Decressin and Fatás (1995) on the regions of Europe and by Obstfeld and Peri (1998) on the regions of a wide range of industrial countries, have addressed that question with respect to the labor force as a whole. However, owing in part to data limitations, none of

those studies has examined whether the relative speed and strength of these adjustment mechanisms depend on workers' educational levels. To fill that gap, this paper analyzes the dynamic responses to regional labor demand shocks in Spain, considering separately various educational groups.

There are good reasons to expect that workers with different educational levels will respond in different ways to regional labor demand shocks. In fact, the opportunity cost of not working is typically higher for the highly skilled.[1] Therefore, in response to a job loss motivated by a collapse in local labor demand, the highly skilled are more likely than low-skilled workers to migrate rather than remaining unemployed or dropping out of the labor force. It is also important to recognize that the adjustment mechanisms to labor demand shocks by workers of different educational levels depend on existing labor market institutions and policies. This can be seen by considering two extreme hypothetical cases: in the presence of very generous unemployment compensation, migration might be an unattractive option for low-skilled workers, though perhaps still not for the highly skilled; by contrast, in the presence of low unemployment compensation, both low-skilled and highly skilled workers might have similarly strong incentives to migrate.

This paper focuses on the case of Spain. It uses a data set on employment, labor force, and working-age population *by educational level* for the 50 provinces of Spain over 1964–92. That data set, published by the *Instituto Valenciano de Investigaciones Económicas*, is almost unique in that similar data are not easily available for any other countries. Beyond the advantage of data availability, however, the case of Spain is extremely interesting in itself. Not only does Spain have the highest unemployment rate (19 percent in mid-1998) among industrial countries, but it also displays large and persistent unemployment rate differences among its regions. By analyzing how workers with different educational levels respond to regional labor demand shocks, this paper considers those issues from a new angle. It also forms part of a broader research agenda on the regional dimension of unemployment in Europe. Related studies, which focus on the persistence of regional unemployment differences and provide further institutional detail, are presented in Mauro, Prasad, and Spilimbergo (1999).

By analyzing the response of workers with different skill levels to regional shocks against the background of Spain's institutions and policies, this paper may lead to useful policy lessons for Spain, but hopefully some of these lessons may be applicable to other countries as well. At the same time, the paper implies that caution must be exercised in drawing conclusions from studies (such as those by Decressin and Fatás, 1995, and Obstfeld and Peri, 1998) that attribute cross-country differences in the dynamics of adjustment to differences in policies and institutions. In fact, by showing that the adjustment to local labor demand shocks depends on workers' educational levels, this paper suggests that future comparative work should also take into account cross-country differences in the educational composition of the labor force.

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[1]Throughout the paper, the terms "skill" and "education" are used interchangeably, although the estimation is based upon data on educational levels.

I. Persistence of Geographic Differences in Unemployment Rates, by Skill Level

Although this paper's main contribution is to estimate how the skilled and the unskilled respond to regional shocks—an exercise that has not been conducted before for any other country—a brief description of the geographic distribution of unemployment in Spain may be useful, particularly because the Spanish case is interesting in itself. This section shows that Spain is characterized by large and persistent geographic differences in unemployment rates, and that the degree of persistence is higher for low-skilled than for highly skilled workers. Therefore, in the Spanish setting, efforts to reduce geographic unemployment imbalances may need to focus on low-skilled workers.

There is a striking variation of unemployment rates among Spain's 17 regions, ranging from about 11 percent in the Balearic Islands to 30 percent in Andalucía in mid-1998. Considering a finer level of geographical disaggregation, namely that of the 50 provinces (provinces are subsets of regions), unemployment rates vary even more widely, ranging from 8 percent in Lleida, Cataluña, to 38 percent in Cádiz, Andalucía. Although patterns in the geographic distribution of unemployment rates are not easy to identify, a broad generalization could be that the southern, agricultural regions, such as Andalucía and Extremadura, and some of the northern regions with declining industries, such as País Vasco, Cantabria, and Asturias, tend to have higher unemployment. In addition to the large differences among regions, there is also substantial variation in unemployment rates among provinces within regions. Again, it is difficult to identify clear patterns, but provinces dominated by large cities seem to have somewhat higher unemployment rates than provinces with only small urban centers. Even though generalizations may not be easy, it is nevertheless clear that a geographic dimension of the unemployment problem exists. In fact, regional dummies explain individuals' employment status to a significant extent when controlling for personal characteristics such as age, gender, and education (Blanchard and others, 1995).

Whatever the determinants of the geographic distribution of unemployment rates, however, there is compelling evidence that the current pattern has persisted for many years. In fact, even the sharp increase in nationwide unemployment since the late 1970s has left the regions' or provinces' unemployment ranking almost unchanged, though absolute differences in unemployment rates have widened considerably. Scatter plots of the survey unemployment rates in 1977 and 1992 for the 50 Spanish provinces reveal a remarkable correlation between the provinces that have higher unemployment rates in the 1990s and those that had higher unemployment rates in the 1970s (Figure 1, top left panel).[2]

The degree of persistence of geographical differences in unemployment varies considerably depending on the labor force participants' skill levels. Based upon data produced by the *Instituto Valenciano de Investigaciones Económicas* (see Appendix I), low-skilled workers seem to display greater unemployment persistence than the highly skilled, as shown by scatter plots of the unemployment rate in 1977 and 1992 in the 50 Spanish provinces for five groups of labor force participants: illiterate, primary-

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[2]The data by skill level are available only through 1992. Scatter plots for all workers are similar when applied to data through the late 1990s. They are also similar for the case of the regions, or using registered unemployment data instead of survey unemployment data—see Mauro, Prasad, and Spilimbergo, 1999.

Figure 1. Spanish Provinces: Unemployment Rates by Skill Level, 1977 and 1992
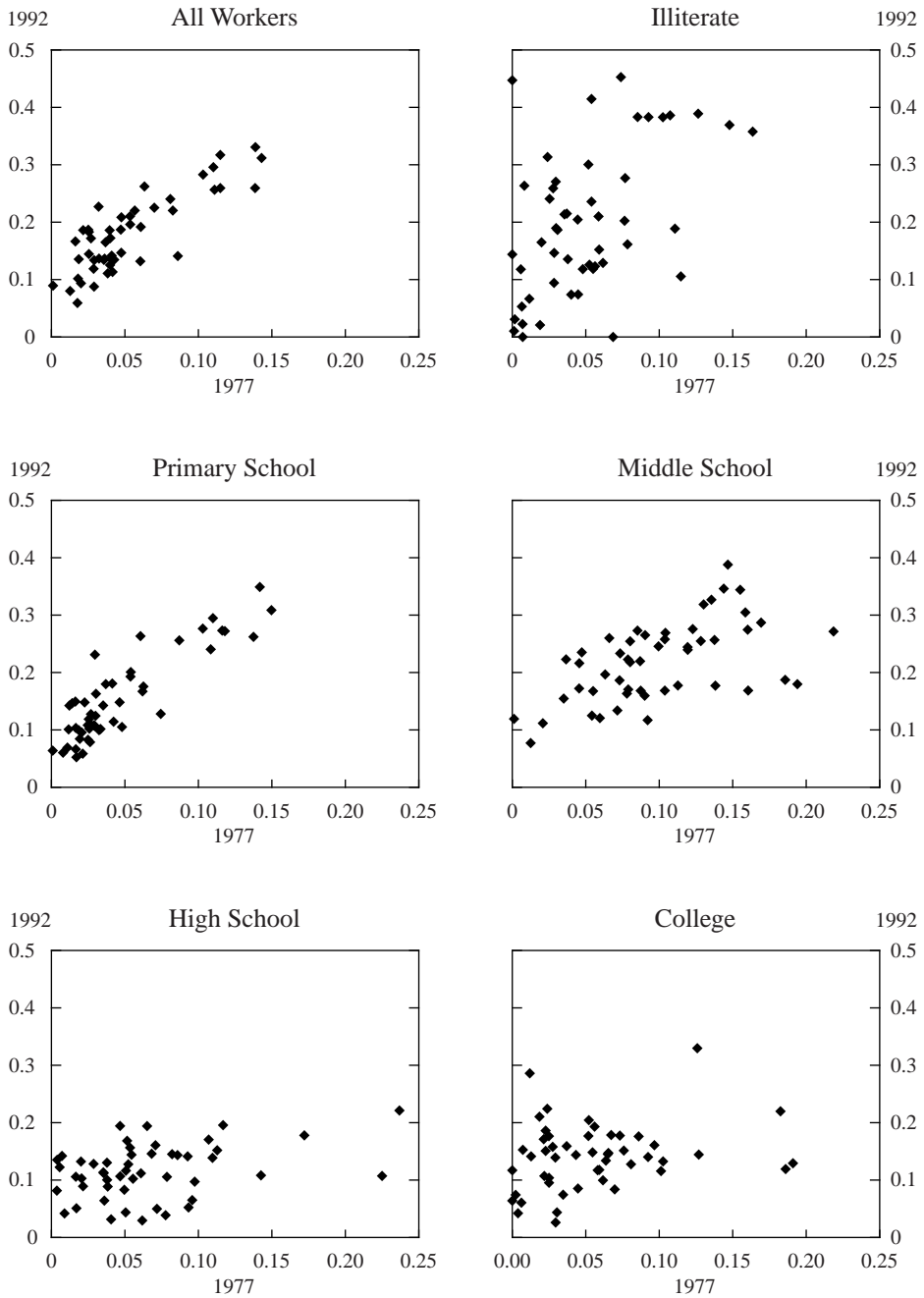
Table 1. Unemployment Persistence by Educational Group, 1977–92

Skill Level	Coefficient of Correlation	Share in the Total Labor Force	
		1977	1992
All groups	0.83	100.0	100.0
Illiterate	0.50	4.1	1.4
Primary school	0.88	74.8	43.8
Middle school	0.56	15.1	42.8
High school	0.35	3.4	5.9
College	0.24	2.7	6.1

Sources: *Instituto Valenciano de Investigaciones Económicas*; and estimates by authors.

school-educated, middle-school-educated, high-school-educated, and college-educated. The relationship between unemployment in the past and unemployment today tends to be closer among low-skilled workers, and looser among highly skilled workers. Table 1 reports, for each educational group, the coefficient of correlation between unemployment in 1977 and unemployment in 1992, as well as each group's share of the total labor force in 1977 and 1992.

The coefficient of correlation between unemployment in 1977 and unemployment in 1992 tends to be higher, the less educated the labor force participants of a given group, with the exception of the illiterate, a small group for which the quality of the data seems to be not as reliable as for the others.[3] In other words, the persistence of geographical unemployment differences, a clear indication of sluggish adjustment to past shocks, is highest among the low-skilled group. The next section analyzes how workers with different skill levels adjust to shocks.

II. How Do Workers with Different Skill Levels Adjust to Shocks?

When there is a negative shock to local labor demand, workers who lose their jobs can react in three ways. First, they can keep looking for a job in the area, thus remaining unemployed; second, they can stop looking for a job, thereby exiting the labor force (and becoming "discouraged workers"); or third, they can migrate to another area.

The decision among these three options is affected by a number of factors, not only macroeconomic (including the nationwide unemployment rate),[4] but also individual,

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[3]The results need to be interpreted bearing in mind that, other things being equal, larger groups (in the present case, primary-school-educated and middle-school-educated) will tend to show a better fit simply because they are subject to fewer idiosyncratic changes.

[4]For instance, migration flows, both toward other countries and within Spain, were very large in the 1960s, but they dropped sharply beginning in the late 1970s. The main reason for this decline is likely to be that absolute unemployment rates rose in the whole country as well as in the rest of Europe. In fact, it is well known that workers tend not to migrate, regardless of how bad prospects are in their current location, if the chances of finding a job once they reach their destination are low. This phenomenon of falling migration at a time of rising absolute unemployment has been well documented not only in the case of Spain (Bentolila, 1997), but also in other countries, including Germany (Decressin, 1994), Italy (Attanasio and Padoa-Schioppa, 1991), and the United Kingdom (Pissarides and McMaster, 1984).

including the level of education. In particular, the decision of moving, like any other investment decision, has costs, in this case social, reallocation, and searching costs, and benefits deriving from the higher stream of wages in the new location.[5] Both costs and benefits depend on the level of education. As the opportunity costs of not working are higher for the skilled than for the unskilled, the former are more likely to migrate than the latter. Similarly, the skilled are less likely to drop out of the labor force than are the unskilled.

The relative speed and strength of the adjustment mechanisms described above is estimated using a panel vector autoregression (VAR) system of employment growth, the employment rate, and labor force participation, for the 50 Spanish provinces over 1964–92. The framework adopted is identical to that developed by Blanchard and Katz (1992), who first applied it to the United States, and similar to that applied by Decressin and Fatás (1995) to Europe, and by Bentolila and Jimeno (1995) to the 17 Spanish regions on quarterly data for 1976–94. As a consequence, the results obtained can be compared to those of the foregoing studies.

The system is the following:

Employment growth:
$$\Delta e_{i\,t} = \alpha_{i\,1} + \beta_1 \,(L)\, \Delta e_{i\,t-1} + \gamma_1 \,(L)\, le_{i\,t-1} + \delta_1 \,(L)\, lp_{i\,t-1} + \varepsilon_{iet}$$

Employment rate:
$$le_{i\,t} = \alpha_{i\,2} + \beta_2 \,(L)\, \Delta e_{i\,t} + \gamma_2 \,(L)\, le_{i\,t-1} + \delta_2 \,(L)\, lp_{i\,t-1} + \varepsilon_{iut}$$

Labor force participation rate:
$$lp_{i\,t} = \alpha_{i\,3} + \beta_3 \,(L)\, \Delta e_{i\,t} + \gamma_3 \,(L)\, le_{i\,t-1} + \delta_3 \,(L)\, lp_{i\,t-1} + \varepsilon_{ipt},$$

where all variables are differences between province i and the national average, in order to focus on developments at the provincial level that are not due to nationwide developments. $\Delta e_{i\,t}$ is the first difference of the logarithm of employment; $le_{i\,t}$ is the logarithm of the ratio of employment to the labor force; and $lp_{i\,t}$ is the logarithm of the ratio of the labor force to the working-age population. There are two lags for each right-hand side variable, to allow for feedback effects from labor force participation and the employment rate to employment growth. (For example, a decrease in labor force participation could lower wages, thereby facilitating an increase in employment growth.) The system is estimated by pooling all observations, though allowing for different province-specific constant terms in each equation, since some provinces may have higher average employment growth, employment rates, and labor force participation rates than others, for reasons that are not captured by the explanatory variables.[6]

The size of a typical local shock to labor demand is large, both in an absolute sense and by comparison to a typical national shock. The standard deviation of the residual in the employment growth equation for all workers amounts to 1.54 percentage points.[7] When the system above is estimated as a VAR at the national level (instead of as a

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[5]Sjaastad (1962) presents the first model in which personal costs and benefits of migration are formally considered.

[6]Further technical issues are addressed in Appendix II.

[7]This is an approximation, since the variables are defined in logarithms.

Table 2. Size of Unemployment Shocks (Standard Deviations)

Educational Level	National	Local
All groups	0.77	1.54
Illiterate	1.93	9.57
Primary School	0.75	3.41
Middle School	3.36	4.56
High School	1.79	5.52
College	2.85	6.67

Source: Authors' calculations.

panel VAR on the deviations of the provinces' data from national averages), the standard deviation of the residual in the employment growth equation for all workers amounts only to 0.77 percentage points. Moreover, the local shocks are larger than the national shocks for each educational group (Table 2). The size of shocks seems to be somewhat larger, the higher the workers' skill level, with the notable exception of the illiterate—a group that, as noted, is relatively small.

The effects of a fall in employment can be traced through time by analyzing the impulse response graphs based upon the estimated parameters of the system above. Those effects can be interpreted as resulting from a decline in labor demand, under the reasonable assumption that most of the year-to-year changes in employment reflect changes in labor demand, rather than labor supply.[8]

The immediate response to a decline in labor demand in a given Spanish province does not differ much from that observed in other countries, though the effects on labor participation are higher in some cases. In response to a 1 percentage point negative shock to employment growth, the unemployment rate immediately increases by 0.31 percentage point, while the participation rate decreases by 0.65 percentage point (Figure 2). The remaining adjustment to the fall in employment is accounted for by migration. The simultaneous impact on the unemployment rate is similar to that estimated by existing studies for both the United States and Europe. The immediate response of the participation rate is similar to that observed in Europe, but much higher in Spain than in the United States, suggesting that the phenomenon of the "discouraged worker" plays a larger role in the former than in the latter.

There are more important differences between Spain and other countries in the extent and composition of adjustment to a negative employment shock after several years. In the case of Spain, migration is not sufficient to bring the unemployment rate back to its preshock level even after more than a decade. The participation rate rises back toward its preshock level, which it reaches after 10 years. These results contrast sharply with those obtained by other studies for both the United States and the rest of Europe, where unemployment rates return to their preshock levels after about five

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[8]Formally, the identifying assumption is that ε_{iet} can be interpreted as an innovation in local labor demand. Correspondingly, current innovations in local employment growth are allowed to affect local employment rates and local participation rates, but not vice versa.

years. In the United States, adverse employment shocks result in a relatively small decline in the participation rate, a small increase in the unemployment rate, and rapid migration, in the first few years. After about five years, both the participation rate and the unemployment rate are back at their preshock levels, and employment remains permanently at (or below) the level attained through the initial shock, with migration being entirely responsible for that full adjustment. In the rest of Europe, the overall pattern of the response to an adverse employment shock is fairly similar to that observed in the United States, although the effects on the participation rate and the unemployment rate are much larger in Europe than in the United States during the first few years, as migration is more sluggish in the former than in the latter.

The analysis conducted above is also applied to each of the five educational groups for which data are available, showing how workers with different skill levels respond differently to local shocks. Five separate systems are estimated, each of which uses data for only one of the educational groups. Figure 2 presents the impulse response graphs for each of the five educational groups, based upon the estimated parameters of the corresponding systems, for a 1 percentage point fall in the respective group's employment.

There are striking differences in the immediate responses among the various groups, particularly with respect to the participation rate and migration. In response to a 1 percentage point fall in employment, the unemployment rate immediately rises by 0.10–0.30 percentage point for all groups. However, while the participation rate drops by 0.60 percentage point or more in the case of the illiterate and those with a primary-school education, and 0.40 percentage point in the case of those with a middle-school education, it falls only by 0.10 percentage point in the case of the two top educational groups. This result is consistent with the view that the less educated are more likely to become "discouraged workers." Conversely, while some low-skilled workers do migrate in response to an adverse labor demand shock, migration takes place much more rapidly among those who are high-school educated and college educated, for whom the opportunity cost of not being employed is larger, since their salaries tend to be higher.[9]

Considerable differences can also be observed in the extent and composition of the adjustment to a fall in labor demand, after several years. Rapid migration implies that the unemployment rate returns to its preshock levels after only three years for those educated up to the high-school or college level. By contrast, in the cases of the illiterate, those educated up to primary-school level, and those educated up to middle-school level, about half of the initial increase in the unemployment rate persists after a decade. In all cases, the participation rate tends to return toward its preshock level, but in the case of high-school and college graduates it reaches the preshock level after only three years, perhaps because the initial impact is relatively small, while in the other cases the initial effects are not fully reversed even after 10 years.

The impulse response graphs in Figure 2 are clearly different. The fact that the dynamic adjustment differs across educational groups is also confirmed by formal

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[9]This result is consistent with Antolín and Bover's (1997) finding that, controlling for personal characteristics (including whether unemployed workers are registered or not), higher education implies not only more migration, but also more responsiveness of migration to geographic unemployment differentials.

Figure 2. Response to 1 Percent Negative Employment Shock
in a Given Province
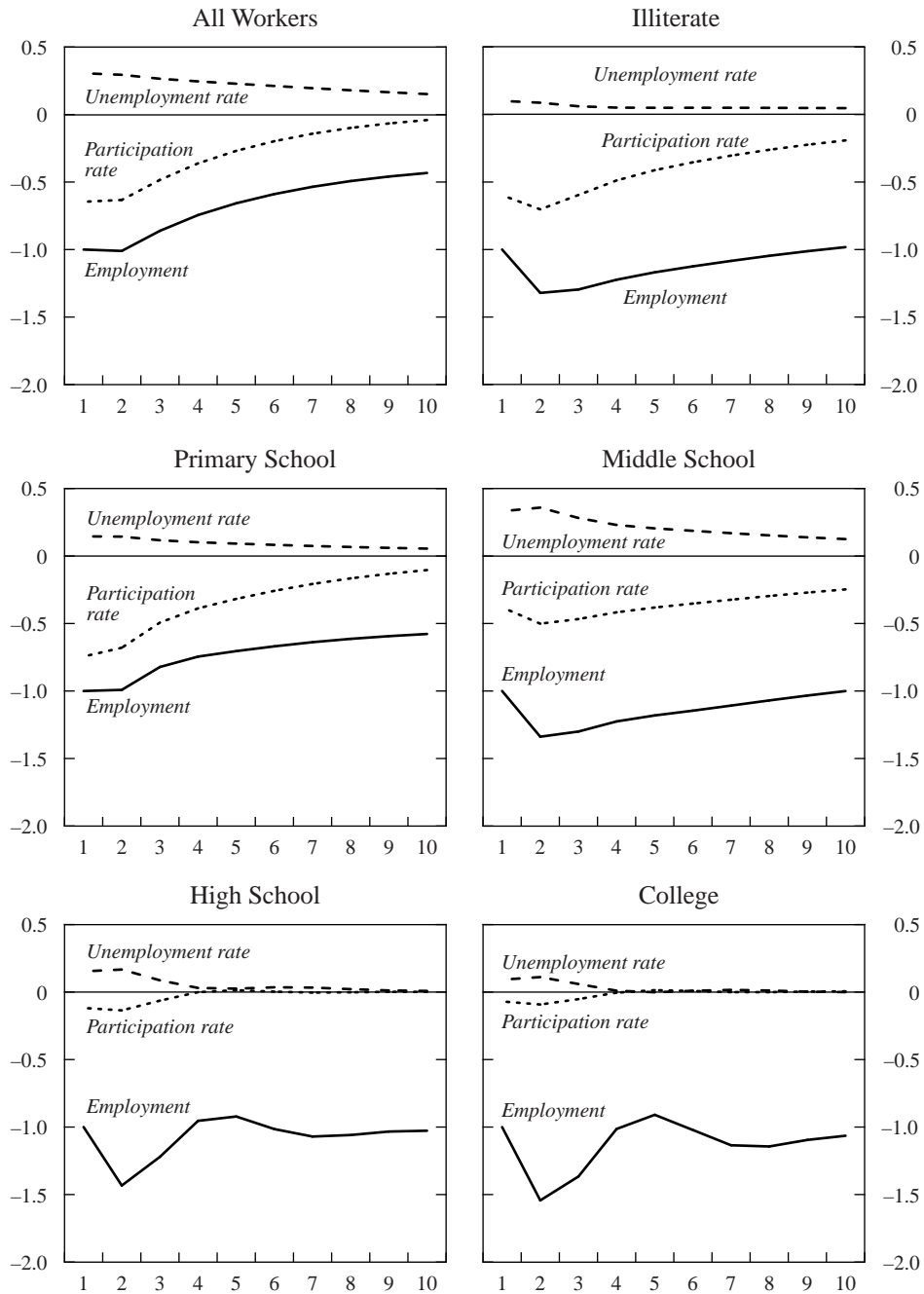
Source: *Instituto Valenciano de Investigaciones Económicas*; and IMF staff estimates.

testing of the null hypothesis that the parameters of the systems for any two educational groups are the same. *F*-tests reject the null at the 1 percent significance in all of the pairwise tests.

The results presented above are robust to changes in the period considered or in the geographical coverage of the sample. For example, when the system is estimated for 1964–77 or 1978–92, or for small groups of provinces (such as those in Andalucía and Extremadura, or in Catalonia), the impulse response graphs for the various educational groups are broadly the same as those obtained using all the 50 provinces.

The analysis above has focused on adjustment in terms of "quantities" (changes in the unemployment rate and the participation rate, and migration). Additional information would be gained by considering the role of "price" incentives (in this case, wages) in determining the adjustment of quantities. That information would make it possible to describe the adjustment of quantities into two components, namely, (1) the adjustment of "price" incentives and (2) workers' and firms' responsiveness to such incentives. Unfortunately, wages by skill level are not available for the 50 Spanish provinces over the period considered in this study. Nevertheless, for the labor force as a whole, there is tentative evidence that the adjustment of wages is sluggish, owing to Spain's de facto centralized bargaining system. Mauro, Prasad, and Spilimbergo (1999) find that wages do not seem to reflect local labor market conditions: in spite of large and persistent geographic differences in unemployment, unit labor costs and real wages do not differ significantly between high-unemployment and low-unemployment areas, so that neither firms nor workers have strong "price" incentives to migrate to correct existing unemployment imbalances.

The different speed of adjustment of labor market quantities to local shocks for different skill groups can be partly explained by the following four factors, all of which are largely outside the control of policy makers.

- First, as noted above, in a comparison of the costs and benefits of moving, migration is more likely to be an attractive option for highly skilled than low-skilled workers. The benefits of taking up a job in another area of the country compared with remaining unemployed in the area of current residence are much higher for highly skilled than for low-skilled workers, since highly skilled workers have higher wages than low-skilled workers, and unemployment benefits are subject to a ceiling. By contrast, the costs of moving are fairly independent of a person's skill level.
- Second, workers with more years of schooling may be better able to adapt to new jobs, including those that are located in different areas of the country.
- Third, information about vacancies in other areas of the country may be much more readily available for jobs that require high skills.
- Fourth, given the remarkable improvement in educational achievement over the past decades, low skills are associated with old age. In particular, more than three-fourths of illiterate and primary-school-educated labor force participants were 35 or older in 1993, compared with one-half for the labor force as a whole. As a result, the illiterate and the primary-school-educated groups might move less promptly than other groups partially because they tend to be older. However, there is no clear relationship between age and educational attainment for labor force participants that are educated to the middle-school level and above (Table 3). For example, middle-school-educated labor force participants are, on average, considerably

Table 3. Composition of the Labor Force by Age
and Educational Attainment, 1993

Age (in years)	Illiterate and Primary School	Middle School	High School	College
	(In percent of total labor force)			
16–24	3.21	14.29	0.56	0.28
25–34	6.45	16.84	2.21	2.70
35–44	11.44	8.57	1.81	1.65
45–54	11.90	3.63	1.11	0.85
55 and above	9.87	1.47	0.60	0.56
Total	42.87	44.80	6.29	6.04
	(In percent of educational group)			
16–24	7.49	31.90	8.90	4.64
25–34	15.05	37.59	35.14	44.70
35–44	26.69	19.13	28.78	27.32
45–54	27.76	8.10	17.65	14.07
55 and above	23.02	3.28	9.54	9.27
Total	100.00	100.00	100.00	100.00

Source: Palafox and others (1995).
Notes: The breakdown between the illiterate and primary-school-educated groups is not available by age group. Data by age group are available only for a slightly different breakdown between middle school and high school than that used in the rest of this paper.

younger than high-school- and college-educated ones. Therefore, speedier labor market adjustment for the high-school- and college-educated workers than for those that are middle-school-educated cannot be explained by differences in age.

Finally, the result that the highly skilled migrate more promptly than low-skilled workers in response to regional shocks is consistent with evidence from the labor force survey on the unemployed workers' willingness to move to obtain a job, for the various educational categories. Only 24.8 percent of illiterate unemployed workers declare themselves willing to move to obtain a job, compared with 45.7 percent of college-educated workers (Table 4). To find a job, the more highly educated are also less likely to declare themselves willing to accept a different type of job than the one they are looking for. Among college-educated unemployed workers, only 35.6 percent declare themselves willing to accept a job of a different type than the desired one, whereas that proportion amounts to 73.6 percent in the case of illiterate unemployed workers. Therefore, it seems that the highly skilled are more willing to move to find a job of the desired type.

III. Current Labor Market Arrangements and Differences in Adjustment

The empirical analysis in the previous sections shows that the unskilled migrate more slowly than the skilled in response to regional shocks. This section attempts to relate that finding to existing labor market arrangements. Although some of these arrangements are

Table 4. Willingness To Move or To Change Type of Job
To Become Employed

(In percent)

	Illiterate	Primary school	Middle School	High School	College	All Workers
Willing to move?						
Yes	24.8	25.8	29.4	39.2	45.7	28.4
No	52.8	47.8	38.1	30.9	26.7	42.3
Did not know or						
did not answer	22.4	26.4	32.5	29.9	27.6	29.3
Willing to change job?						
Yes	73.6	72.9	66.3	51.6	35.6	68.9
No	9.2	6.9	9.0	23.3	35.3	8.7
Did not know or						
did not answer	17.2	20.2	24.7	25.1	29.1	22.4

Source: Palafox and others (1995).
Note: Column heads represent the highest level of education achieved.

specific to Spain, many are present in other countries. Therefore, several policy lessons may be relevant for other countries as well.

In the Spanish context, the key barrier to the reduction of existing geographical unemployment differences and the prompt adjustment to local labor demand shocks seems to be the de facto centralized wage bargaining system. Existing policies and arrangements in other goods and factor markets (e.g., the housing market) also seem to hamper adjustment to shocks. However, these barriers are likely to affect labor force participants of all educational levels in a similar manner.[10] This section reviews current policies and arrangements in the labor market that hamper the mobility of low-skilled workers, even though probably not that of other groups. These include programs to help agricultural workers in specific depressed areas (Andalucía and Extremadura), minimum wage legislation, and the unemployment benefit system.[11]

Programs to help workers in depressed areas reduce incentives for these workers to accept lower wages or to seek jobs elsewhere. An example is the agricultural employment plan (*Plan de Empleo Rural*), which provides farm workers (who are typically low skilled) in Andalucía and Extremadura with temporary jobs in state-financed infrastructure projects and unemployment assistance for a substantial portion of the remainder of the year.[12]

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[10]At the same time, it may be argued that illiquid rental markets make it difficult to move, especially for the less affluent groups of workers, that is, typically, the low-skilled group.

[11]Further institutional detail not only on the labor market, but also other goods and factor markets, is provided in Mauro, Prasad, and Spilimbergo (1999).

[12]Under that program, which covers about 250,000 workers and accounts for about 5 percent of total expenditure on unemployment benefits in Spain, as few as 40 days' work a year entitle workers to 75 percent of the statutory minimum wage for 40–360 days a year (depending on their age).

Minimum wages may play some role in preventing wages from falling sufficiently to encourage the creation of new jobs at the low end of the pay scale. Their importance in determining labor force participants' willingness to take up jobs is increased by the fact that it affects the level of unemployment assistance and the ceiling and floor for unemployment benefits. Spain's statutory minimum wage, currently at 32 percent of the average adult wage (after gradually declining from 40 percent in 1985), is not high by international standards.[13] Moreover, it is nationwide, with no adjustments for differences in the cost of living in the various areas of the country. While this institutional feature of the labor market is probably of little consequence for the highly skilled, it may have important consequences for low-skilled workers, particularly in areas where productivity and the cost of living are low.

Unemployment protection reduces unemployed workers' job search efforts and raises the participation rate, thereby contributing to high unemployment and low labor mobility. Spain's unemployment benefit system is fairly generous by international standards, though not sufficiently so to explain why Spain's unemployment rate is higher than in other countries.[14] The benefit system is rendered particularly generous by the possibility of cumulating unemployment benefits paid by the state with sizable dismissal benefits paid by the employer.[15] Antolín and Bover (1997) find that, after controlling for personal characteristics, the unregistered unemployed, who do not receive unemployment benefits, are more mobile than the employed and the registered unemployed. Such adverse effects are particularly important among the low-skilled workers, because benefits are capped.

IV. Concluding Remarks

Using a unique and relatively underexplored data set on the Spanish provinces, this paper has shown that the adjustment to a local labor demand shock varies depending on the educational level of the workers affected by it. Faced with the loss of their job, the highly skilled tend to migrate promptly, whereas low-skilled workers are more likely to drop out of the labor force or to remain unemployed. This is an intuitive result, in light of the fact that the opportunity cost of not working is typically higher for highly skilled than for low-skilled people.

The paper also points out that differences in the adjustment process between the highly skilled and the low-skilled groups depend on existing policies and institutions. For example, unemployment protection may reduce the attractiveness of migration for low-skilled workers to a greater extent than it does for the highly skilled. Similarly,

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[13]It is well below the average—of more than 50 percent of the average adult wage—for European Union countries that have a statutory minimum wage. It is also below the average of the minimum wages set through collective agreements in European Union countries that do not have a statutory minimum wage.

[14]In particular, a thorough comparison between the unemployment benefit systems and other labor market institutions in Spain and Portugal reveals that the differences between these two countries are rather limited, raising the puzzle of why unemployment is so much worse in the former than in the latter (Blanchard and Jimeno, 1995). Bover, García-Perea, and Portugal (1998) argue that Portugal's better labor market performance can be attributed to its much lower unemployment compensation prior to 1985.

[15]Permanent workers hired before May 1997 typically receive their full salary for 45 days per year worked, up to a maximum of 42 weeks, if they are dismissed for "unjustified" economic causes, which tends to be the majority of cases.

minimum wages may set an artificial floor on the wages of the low-skilled, although their impact on the highly skilled is probably negligible. Therefore, policy makers should devote particular attention to the impact of these policies and institutions on the low-skilled groups. More generally, this paper's finding that labor market adjustment is more rapid among the highly skilled provides a new argument in favor of promoting the educational level of the workforce.

On the specific case of Spain, these considerations may provide clues to why the persistence of geographic unemployment differences is more pronounced among low-skilled workers than among the highly skilled, as well as on why geographic unemployment differences are persistent for the labor force as a whole and, in turn, on why nationwide unemployment is persistently high.

There are two avenues for further research. First, the results obtained in this study cannot be entirely divorced from the policies and institutions of Spain. Although it is reasonable to expect that the key results and related policy conclusions may extend beyond the case of Spain, this needs to be confirmed by studies on other countries. Second, owing to data limitations, this study has focused on labor market adjustment to shocks (and geographic unemployment differences) through migration of *workers*. However, migration of *firms* seems to be both more desirable and more effective an adjustment mechanism to reduce geographic unemployment imbalances.

Finally, this study suggests a caveat to the conclusions drawn by existing studies that attribute cross-country differences in the dynamics of adjustment to differences in policies and institutions. By pointing out that adjustment depends on workers' skill levels, this study suggests that future comparative work should also strive to take into account cross-country differences in the educational composition of the workforce.

APPENDIX I

Data Description

The data on working-age (16–65) population, labor force, and employment by province and by skill level, for 1964–1992, are drawn from Mas, Pérez, Uriel, and Serrano (1995). Nothing comparable to this data set exists for other countries. It provides data on working-age population, active population, and employment for the 50 Spanish provinces, for people belonging to five groups with different skill levels: illiterate, primary-school-educated, middle-school-educated, high-school-educated, and college and above. The data are based on a very comprehensive data collection project conducted by the *Instituto Valenciano de Investigaciones Económicas* (IVIE). Since 1977, the basic source of information used for that project are the individual replies to the labor force survey by the Instituto Nacional de Estadística (INE). These individual replies include information on the respondent's educational attainment, which is typically not reported with any geographical disaggregation by the INE but which constitutes the focus of the IVIE study. Prior to 1977, the information is based on less disaggregated information from the labor force survey, and other sources including censuses and statistics on schooling. All in all, while some judgment may have been applied (particularly for the illiterate in the period prior to 1977) to correct the series obtained from such a wide range of sources, the data seem very reliable.

The data on the labor force composition by age and skill level are drawn from Palafox, Mora, and Pérez (1995).

APPENDIX II

Technical Issues

This appendix describes some key features of the individual series of employment growth, the unemployment rate, and the participation rate, and addresses a number of technical issues related to the estimation of the VAR system in Section II.

Characteristics of Individual Series

This section provides summary statistics on employment growth, the unemployment rate, and the participation rate for all workers and the five educational groups, and estimates the extent to which individual provincial series covary with national ones. It also reports the results of unit root tests.

The 1964–92 average employment growth was lowest for the illiterate and the primary-school-educated groups, as the working-age population belonging to these groups decreased sharply during the past decades. Unemployment rates did not differ systematically by educational group over the period as a whole, since in the 1960s and early 1970s unemployment rates were extremely low for the low-skilled group. This is in sharp contrast to the current situation, where high unemployment rates are strongly associated with low education. The participation rate has always been much higher, the higher the educational level, ranging from 19 percent for the illiterate group to 81 percent for the college-educated group over the period (see Table A1).

Changes in employment growth, the unemployment rate, and the participation rate at the provincial level can be decomposed into a national and a provincial component. To determine the relative magnitude of the provincial components, the following regression is run for each of the 50 Spanish provinces:

$$X_{i\,t} = \alpha_i + \beta_i X_t + \eta_{i\,t} \text{ where } I = 1 \ldots 50,$$

where $X_{i\,t}$ is the provincial variable (namely, employment growth, the unemployment rate, and the participation rate) at time t, and X_t is the same variable at the national level. Table A1 reports the weighted average (by each province's share of Spanish population) of the adjusted R^2 for the 50 regressions, for each variable, and for each group of labor force participants.

In the case of all workers, the average adjusted R^2 amounts to 0.46 for the employment growth rate, 0.94 for the unemployment rate, and 0.50 for the participation rate. In other words, only about half of the changes in provincial employment growth and the participation rate are explained by movements in the corresponding national variables.[16] By contrast, unemployment rates at the provincial level are extremely highly correlated with nationwide unemployment rates, suggesting that unemployment rates seem to vary in near-unison throughout the country, though some provinces have always much higher unemployment rates than others. The covariance of provincial and national variables is similar for all educational groups in the case of employment growth and the unemployment rate, but is much higher for low-skilled than for highly skilled workers in the case of the participation rate.

Augmented Dickey-Fuller unit root tests yield the following results. Employment levels are integrated of order one. Unemployment rates typically have a unit root, another sign that they are persistent over time.[17] The evidence on whether participation rates have unit roots is rather mixed.

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[16]For the 50 U.S. states, Blanchard and Katz (1992) find an average adjusted R^2 of 0.60, suggesting that aggregate shocks explain local developments to a slightly greater extent in the United States than in Spain.

[17]This result is consistent with Bentolila and Jimeno (1995), who find high persistence in local Spanish unemployment rates. It contrasts sharply with the evidence on the United States, where unemployment rates are not persistent

Table A1. Individual Series Average Levels and Covariance with the National Variables

	All Workers	Illiterate	Primary School	Middle School	High School	College
Employment growth						
Average (in percent)	2.80	–6.00	–2.00	9.00	4.00	5.00
Average of adjusted R^2	0.46	0.37	0.39	0.56	0.32	0.34
Unemployment						
Average (in percent)	11.00	11.00	9.00	16.00	8.00	8.00
Average of adjusted R^2	0.94	0.76	0.93	0.93	0.88	0.88
Participation rate						
Average (in percent)	50.00	19.00	49.00	49.00	65.00	81.00
Average of adjusted R^2	0.50	0.91	0.84	0.95	0.53	0.31

Technical Issues on the VAR System

The specification of the VAR system estimated in Section II follows Blanchard and Katz (1992) exactly, to permit international comparison of the results. Nevertheless, a number of alternative specifications were estimated to show that the results are robust to specification changes. The results are broadly similar if the system is estimated by using differences rather than levels of the employment rate, or differences of employment growth and levels of the other two variables. The results are very similar to the ones reported in Section II if three or four lags of all the variables are used, instead of two lags.

Current innovations in provincial employment growth are allowed to affect provincial employment rates and provincial participation rates but not vice versa, consistent with the interpretation of ε_{iet} as an innovation in provincial labor demand. The covariance matrix of the residuals confirms that the contemporaneous correlation between ε_{iet} with the innovations in the employment rate, ε_{iut}, and in the participation rate, ε_{ipt}, is very low by comparison with the variation in ε_{iet}. In other words, the first elements of the second and third row in the covariance matrix of the residuals (all educational groups) reported below are very small compared with the first element in the first row.

$$
\begin{array}{lll}
7.4514\text{e}{-}004 & & \\
3.3023\text{e}{-}007 & 1.7100\text{e}{-}004 & \\
-3.2700\text{e}{-}007 & -1.6334\text{e}{-}004 & 1.8686\text{e}{-}004
\end{array}
$$

The covariance matrices for the other systems for the five educational groups are similar to the one reported above.

Finally, it is well known that using the standard within-group estimator for dynamic models with fixed individual effects generates estimates that are inconsistent, even in the case of a large number of individuals. However, the size of the bias decreases as the length of time period increases, and the panel estimated in this paper uses about 30 years of data, a relatively long sample period.

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