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ABSTRACT

Labor Market Institutions and Long-Term Effects of Youth Unemployment*

Graduating from a school during a time of adverse economic conditions has a persistent, harmful effect on workers' subsequent employment opportunities. An analysis of panel data from OECD countries during the 1960-2010 periods reveals that a worker who experiences a one-percentage-point higher unemployment rate while the worker is 16-24 years old has a 0.14 percentage-point higher unemployment rate at ages 25-29 and 0.03 percentage points higher at ages 30-34. The persistence of this negative effect is stronger in countries with stricter employment protection legislation. A composite index for labor market rigidity is constructed and the index is shown to have positive correlation with the persistence. Moderating macroeconomic fluctuations is more important in countries that have more persistent labor-market entry effects on subsequent outcomes.

NON-TECHNICAL SUMMARY

How does graduating from a school during a recession affect future employment opportunities? This study reveals that the cohort that experience high unemployment rate in youth tends to have higher unemployment rate in their middle age using panel data of 20 OECD countries. The persistence varies significantly across countries. Rigid labor market institutions exacerbate the persistence.

JEL Classification: E24, J64, J65, K31

Keywords: unemployment, port of entry, cohort analysis, persistence, hysteresis

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1. Introduction

A large negative shock to the labor market after the financial crisis in 2008 sharply increased the youth unemployment rate in many developed countries. There is much disagreement about the severity of this problem, however. Optimists argue that an economic recovery quickly reduces the youth unemployment rate, because this unemployment rate is more responsive to the business cycle.[1] In contrast, an emerging literature points out that being unemployed as a youth tends to have lasting negative effects on employment and earnings in later life, because unemployment in youth deprives individuals of opportunities to accumulate human capital from career jobs (von Wachter and Bender (2006), Oreopoulos, Wachter and Heisz (2012)). The strength of such a scarring effect could be stronger in economies with a lower labor-market turnover rate. Indeed, Genda, Kondo and Ohta (2010) found that an adverse labor-market environment at school graduation has a more detrimental impact on employment status in later life in Japan than in the US. The well-established school-to-work transition and the well-organized internal career development system of Japan adversely affect workers who fail to find a career job at the time of school graduation.

Figure 1 illustrates life-cycle unemployment rates by birth-year cohort in the US. A person born in 1965 has a lower probability of being unemployed at ages 15-19 and 20-24 than a person born in 1960. The better labor market of the 1965-born person than the 1960-born person at ages 15-24 marginally persists when he is 25-29. At ages 30-34,

[1] Previous literature shows that youths' unemployment rate is more cyclically sensitive than that of adults (Clark and Summers (1981), Alba-Ramirez (1995), Rios-Rull (1996), Gomme, Rogerson, Rupert and Wright (2005), Bertola, Blau and Kahn (2007) and Jaimovich and Siu (2009)).

the 1960 cohort and the 1965 cohort share the same rate of unemployment. The figure for Italy in Figure 2 contrasts with the US figure. The 1960 cohort, which had a lower probability to be unemployed than the 1965 cohort at ages 15-19 and 20-24, continues to have a lower probability of unemployment at ages 25-29. The comparison of the US and Italy seems to suggest a more significant scarring effect in Italy. Nothing definitive can be said, however, because the contrast could be a product of Italy's growing unemployment rate in recent years. Therefore, controlling for cross-country differences in the temporary business cycle is required to reach a definitive conclusion.

The relative strength of the scarring effect in an economy has important implications for fiscal and monetary authorities, because with a strong scarring effect, transitory unemployment at youth easily can turn into permanent unemployment (Dickens and Triest (2012)). In such an economy, smoothing short-term volatility could yield a substantial benefit. In spite of the strong implications of the scarring effect for policy makers, examinations of the scarring effect have been limited to careful studies based on micro data from several developed countries, as reviewed in the next section. The differences among scarring effects across economies and the scarring effect's dependence on labor-market institutions are largely unknown to date.

Against this background, this paper measures the heterogeneity of the scarring effect across economies using cross-country panel data of OECD countries between 1960 and 2010, with a focus on the life-time unemployment experience of a particular cohort. Specifically, the regression coefficient of the cohort-year-specific unemployment rate on the cohort's unemployment rate at ages 15-24 identifies the strength of the dependence. In the estimation, we control for the country-year-specific business cycle. Then, the strength of the dependence across countries is related to indexes of labor-market

institutions, such as the strictness of employment protection legislation. We expect more rigid labor markets to have stronger dependence, because labor-market mobility at mid-career is lower in economies with rigid labor-market institutions.

The analysis based on pooling 20 OECD countries reveals that a high unemployment rate at ages 15-24 increases the unemployment rate at subsequent ages, but the effects gradually fade away and disappear by age 40. A one percentage-point higher unemployment rate at 15-24 increases the unemployment rate by 0.142 percentage point at 25-29, 0.033 percentage point at 30-34, and 0.012 percentage point at 35-39. The persistence of the effect of the unemployment rate at 15-24 on subsequent ages is stronger in countries with stricter employment protection legislation. In countries with a stricter employment protection index than the median, the persistence coefficient is 0.185 at 25-29, whereas in countries with looser employment protection than the median, the coefficient is -0.052. The stronger persistence effect in countries with stricter employment protection is explained by the lower entry rate into and lower exit rate out of unemployment in these countries. Labor market rigidities in general, represented by a composite index for the labor market institutions, significantly increase the persistence effect.

2. Persistence of labor-market conditions upon school graduation

Previous research indicates that labor-market conditions at youth might have a persistent effect on subsequent employment status and wages. Gibbons and Waldman (2006) consider a model of the internal labor market that consists of two jobs: a career job and a dead-end job. Output of the career job depends heavily on workers' skill, while output of the dead-end job does not. The relationship between the output and workers'

skill leads to the selection of skilled workers into career jobs and unskilled workers into dead-end jobs. Evidence suggests that the demand for the output of a career job is more sensitive to the business cycle;[2] therefore, the fraction of workers assigned to career jobs increases as a business expands. A worker assigned to a career job accumulates skill and enjoys wage growth. Meanwhile, the mobility between career jobs and dead-end jobs is limited because of occupational specificity of skill.

Gibbons and Waldman (2006) do not directly predict persistence of the labor-market condition at youth on subsequent career development, because the port of entry into a job is not necessarily limited to school graduation. However, in labor markets where an employer-employee match is difficult to resolve because of high firing cost, the port of entry to a career job tends to be concentrated at school graduation.[3]

In economies with rigid labor markets, school graduation is more or less the time when the port of entry is wide open. In contrast, in economies with flexible labor-market institutions, such as low firing costs, employers fire workers even from career jobs if the match quality turns out to be bad. Accordingly, the employer does not have to be too cautious about making hiring decisions and the port of entry to career jobs is open to mid-career workers. In economies where young workers typically change employers several times to find better matches, as in the US (Topel and Ward (1992), Neal (1999), Neumark (2002) and Yamaguchi (2010)), or the credentials for occupational skills are

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[2] Studies show that the quality of jobs increases during an economic boom (Reder (1955), Okun (1973), McLaughlin and Bils (2001), Devereux (2002) and Aaronson and Christopher (2004)).

[3] An important institutional condition that facilitates good matches between employers and employees, particularly among unskilled workers, is school-to-work transition, for example, information sharing between firms and high schools in Japan and the combination of vocational education and the apprenticeship system in Austria, Denmark, Germany, Switzerland, and Norway (United States General Accounting Office (1990), Neumark (2002), Quintini, Martin and Martin (2007) and Genda, et al. (2010)).

well established, as in Germany (Dustmann and Meghir (2005)), workers who face initial adverse labor-market conditions may quickly recover in subsequent years through finding a proper job. A relatively wider entry port to a career job and high job mobility gives a second chance to unlucky youth who graduate from school in a bad economy to move into a career job. Stricter employment protection legislation generally lowers workers' mobility (OECD (2004) Chapter 2) and presumably narrows the age ranges of those who can access the port of entry to career jobs.

Entry jobs for youth, such as apprenticeship openings, are susceptible to economic prospects and shrink during economic downturns (Quintini, et al. (2007)). Even an occupation that requires general skill and for which individual productivity is public information, such as in the case of academic economists, the initial placement, which is partly determined by the business cycle, plays a significant role in individuals' career progression (Oyer (2006)). Labor-market frictions are presumably lower at the timing of school graduation, because at that time, many employers and employees enter a labor market and interact under institutional arrangements for the matching process. The importance of school graduation as the port of entry to a career job is more significant in economies with rigid labor-market institutions, such as high firing cost. In sum, across occupations, the timing of school graduation is an important aspect of the port of entry into career jobs. In addition, the degree of labor-market mobility determines the size of the port of entry to career jobs for workers who are already in the labor market.

Researchers in a wide variety of countries have accumulated knowledge about the strength of the persistence of the initial labor-market condition on subsequent outcomes.[4] All the results, except for Gaini, Leduc and Vicard (2012) for France,

[4] Neumark (2002), Kahn (2010), Genda, et al. (2010), and Boehm and Watzinger (2012)

indicate significant effects of the initial labor-market condition on subsequent outcomes. A worker who starts his career in an adverse economic condition, typically approximated by a high unemployment rate, is likely to earn less and is less likely to work. The extent of the persistence of the initial labor-market condition could differ across countries, but making comparisons across countries is difficult because extant studies use a wide variety of different outcome variables, initial condition variables, and age ranges. Paying attention to the difference in the adjustment margin by either employment or wage is particularly important when making international comparisons. The negative shock at the time of labor-market entry adversely affects the employment outcome of a cohort in a country with inflexible wage-setting institutions, while it negatively affects wages in a country with flexible institutions.

Notwithstanding the difficulty in making international comparisons, Genda, et al. (2010) apply the same estimation methods to comparable Japanese and US datasets and reveal stronger persistence in Japan than in the US. The stronger persistence of initial labor-market conditions on subsequent outcomes in Japan than in the US provides suggestive evidence for the importance of labor-market institutions as a determinant of the degree of the persistence. This paper aims to offer more systematic evidence relying on findings from more countries.

3. Labor-market institutions and the scarring effect

Through the mechanism described in the previous section, the initial unemployment experience may cause subsequent unemployment: the scarring effect. The scarring

for the US; Oreopoulos, et al. (2012) for Canada; Ohtake and Inoki (1997), Kondo (2007), and Genda, et al. (2010) for Japan; Brunner and Kuhn (2010) for Austria; Gaini, et al. (2012) for France; Liu, Salvanes and Sørensen (2012) for Norway; and Luijkx and Wolbers (2009) for the Netherlands.

effect is characterized as a cohort-specific labor-market outcome that depends on the labor-market-entry condition of the cohort. With the labor market data defined at the age-country-year level, the unemployment rate of age a, in country i, in year t can be decomposed into three-way fixed effects and an idiosyncratic error term as follows:

$$u_{ait} = f_{at} + g_{ai} + d_{it} + v_{ait} \qquad (1)$$

The first fixed effect f_{at} represents a common shock on the same age group across countries in a specific year. For the sake of saving the degree of freedom, we assume away from such an age-specific common shock throughout this paper.

The second fixed effect g_{ai} captures the country-specific age profiles of the unemployment rate. We first assume that the age profile of the unemployment rate is common across all countries and linear in age, such as $age \times \gamma$. We subsequently relax this assumption to allow for different slopes between countries, because age profiles of unemployment rate could well be different across countries.

The third fixed effect, d_{it}, represents country-year specific shock that affects all age groups within a country. Allowing for these fixed effects is indispensable, because a country-specific business cycle drives the country's unemployment rate up and down.

The main contribution of this paper is to decompose the age-country-year idiosyncratic shock, v_{ait}, into the cohort-specific effects and temporary effects. The cohort, *c*, is defined as the year of birth, which is *c=y-a.* The idiosyncratic error is decomposed into age-dependent cohort-specific effects and cohort-country-year idiosyncratic shock, such as $v_{ait} = h_{aci} + e_{cit}$. The scarring effect points to the dependence of the age-dependent cohort-specific effect, h_{aci}, on the unemployment rate at the cohort's labor-market entry, which is approximated by the unemployment rate at ages 15-24. The strength of the

scarring effect is likely to decay as the cohort ages. Therefore, we specify the age-dependent cohort-specific effect as: $h_{aci} = u_{15-24ci} \times age_{ct}\beta$, where $u_{15-24ci}$ is the unemployment rate that cohort *c* faced at ages 15-24 in country *i*. The age_{ct} is the vector of age dummy variables of cohort *c* in year *t*, and β is the vector of unknown coefficients.

Combining the aforementioned assumptions together, the basic model that captures the scarring effect, which allows the effect to decay, is specified as

$$u_{cit} = u_{15-24ci} \times age_{ct}\beta + age_{ct}\gamma + d_{it} + e_{cit} \qquad (2)$$

where *u* is the unemployment rate, *c* is the cohort index, *i* is the country index, *t* is the year index, and *age* is a dummy-variable vector that includes dummy variables corresponding to 25-29, 30-34, 35-39, and 40-44. Each coefficient in β captures the persistence of the initial labor-market condition on each age group. Coefficients in γ summarize the differences in unemployment rates across age groups over years. The unobserved macroeconomic shock that affects the unemployment rates of all age groups in country *i,* year *t*, is captured by d_{it}, which is treated by country-year fixed effects in the estimation. The country-year fixed effects presumably capture the overall unemployment rate for all age groups, but we do not include the variable in the specification because it is necessarily endogenous.[5] Note that the country-year fixed effects do not soak up the variation of cohort-specific unemployment rate at youth, $u_{15-24ci}$, because it varies across country-cohort cells.

The degree of persistence of the initial labor-market condition on subsequent outcomes

[5] The estimation results in the subsequent analysis do not change substantially even if we include the overall unemployment rate for ages 15-64 in place of country-year fixed effects.

could depend on labor-market institutions, as discussed in the previous section. The hypothesis that such persistence depends on institutions is tested in the following analysis.

As a labor-market-institution measure to capture a worker's potential mobility across firms, we focus on the index for the degree of employment protection legislation (EPL). Although the extent of EPL's effect on the level of the unemployment rate is controversial,[6] a clear consensus exists on EPL's effect on job flow: Strict EPL decreases both inflow into and outflow from the unemployment pool (Bertola and Rogerson (1997), Boeri (1999), Pedro and Olivier (2001), OECD (2004)). Exploiting the index for employment protection, we are not interested in the effect of employment protection per se; rather, we are interested in capturing labor-market rigidity by using the measure. In addition, we consider the composite index of labor market rigidity to capture a worker's mobility across firms as a robustness check.

Extending the basic model slightly, estimating the following model captures how the persistence of the scarring effect depends on labor-market institutions, such as EPL.

$$u_{cit} = u_{15-24ci} \times age_{ct} \times inst_i \beta + age_{ct} \times inst_i \gamma + d_{it} + e_{cit} \qquad (3)$$

where $inst_i$ is the sample-period average of the institution index of country i. We use the sample-period average of the institution index, because the indexes are almost time

[6] See Lazear (1990), Blanchard and Wolfers (2000), and Botero, Djankov, Porta, Lopez-De-Silanes and Shleifer (2004) for evidence that strict EPL increases the unemployment rate. See Nickell (1997) and Baccaro and Rei (2007) for evidence that strict EPL is not related to the unemployment rate. Garibaldi and Violante (2005) show, theoretically and empirically, that EPL's effect on the unemployment rate depends on wage-setting institutions.

invariant within a country and we are interested in cross-country differences in the persistence of the initial labor-market condition. Moreover, matching the time-variant institutional index is conceptually difficult, because we are interested in the long-term impacts of institutions for up to a 30-year period: the impact of the condition at 15 years old on the condition at 44 years old. As the institution variables, we pick up the strictness of employment protection and the composite index for labor-market rigidity as determinants of workers' potential mobility across firms.

The term $age_{ct} \times inst_i$ allows for country-specific age profiles of unemployment rate, g_{ai}, in a parametric way. The inclusion of this term is potentially important, because rigid labor-market institutions tend to increase the youth unemployment rate in particular. Omitting this term could cause an omitted variable bias on $\hat{\beta}$ because the variable is correlated with $u_{15-24ci} \times age_{ct} \times inst_i$ by construction.

4. Data

We build a panel dataset of OECD countries from 1960 to 2010 from two sources. Five-year-interval age-specific and overall labor-force statistics are from the OECD Stat Extracts. Age groups of our concern are 15-19, 20-24, …, 35-39 and 40-44, based on a presumption that the effect of the entry-labor-market condition on subsequent outcomes completely fades away by age 45. Excluding ages 45 and above is also helpful to sidestep issues related to early retirement in some countries because of incentives created by disability insurance and pension systems (OECD (2005) and Tatsiramos (2010)).

The EPL index and the other labor-market-institution indexes are from the CEP-OECD institution dataset by Center for Economic Performance of London School

of Economics (Nickell (2006)). While the CEP-OECD Institution Dataset contains the various institutional indexes of 20 OECD countries from 1960 to 2004, we pay particular attention to an index for the strictness of EPL. After 2004, EPL is extended based on the OECD labor-market statistics database for the period until 2010.

Since the EPL index alone may not be sufficient to represent a country's labor-market rigidity, we also consider a composite index created from other indexes available in CEP-OECD Institutions Dataset: EPL, union coverage, and the benefit duration of unemployment insurance. Union coverage is available until 2000 and the value after 2000 is extrapolated; similarly, benefit duration is available until 2003 and the value after 2003 is extrapolated. The indexes for EPL, union coverage, and benefit duration are missing for the first few years for some countries.[7] In such instances, the value for the first year is used to fill the missing values.

Strict EPL reduces workers' mobility between firms. Indeed, Kawaguchi and Murao (2012) find that negative macroeconomic shock increases the youth unemployment rate in countries with stricter EPL, while it insulates older workers from a negative shock. The OECD employment protection index is constructed from 21 items of three different aspects of EPL: (1) protection against individual dismissal, (2) additional costs for collective dismissal, and (3) the regulation of temporary contracts.[8]

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[7] EPL is only available from 1975 for Portugal. Union coverage is only available from 1980 for Austria, France, Japan, New Zealand, Portugal, Spain, Sweden, and Switzerland. Benefit duration is only available from 1974 for Portugal.

[8] Individual dismissal of workers with regular contracts incorporates three aspects of dismissal protection: (i) procedural inconveniences that employers face when starting the dismissal process, (ii) notice periods and severance pay, and (iii) difficulty of dismissal. some countries impose additional costs for collective dismissals When an employer dismisses a large number of workers at one time, such as additional delays, costs, or notification procedures. Regulation of temporary contracts quantifies the regulation of fixed-term and temporary work agency contracts with respect to the types of work for which these contracts are allowed and their duration. This measure also includes regulations governing the establishment and operation of temporary work

EPL, however, may not be a sufficient characteristic to capture the labor-market institutions that determine labor market mobility. Blanchard and Tirole (2008) and Algan and Cahuc (2009), for example, argue that EPL and unemployment insurance are two major alternative institutions that offer insurance against a negative labor-market shock.[9] The strength of other labor-market institutions, such as labor unions or wage-setting institutions, may also determine workers' mobility in a labor market. Kawaguchi and Murao (2012) find that the generosity index of the unemployment insurance system, in addition to the employment protection index, affects the relationship between a macroeconomic shock and the fluctuation of age-specific unemployment rates.

Table 1 reports the descriptive statistics of the analysis data. The unemployment rate for ages 15-24 is used to capture the entry labor-market condition and the unemployment rate for age groups above 25 is used to capture the subsequent labor-market outcome. The sample sizes for higher age groups decrease, because fewer cohorts have the unemployment rate both at the older age and at ages 15-24. The unemployment rate declines as workers age until 30-34 and becomes stable afterward. The same applies to the employment population ratio: The employment rate increases until ages 30-34 and becomes stable afterward. For the institutional index, we use average index over years within a country to exploit only the cross-country variation. Table 2 tabulates the average of each country's index over the 1960-2010 period. The EPL index ranges from 0.07 (US) to 1.21 (Portugal); union coverage ranges from 20 (The

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agencies and requirements for agency workers to receive the same pay and/or conditions as equivalent workers in the user firm.

[9]Algan and Cahuc (2009) demonstrate that higher civil virtue tends to increase unemployment insurance and decrease employment protection as an insurance mechanism.

US) to 98 (Austria); and the benefit duration is from 0 (Canada and Japan) to 1 (Australia and New Zealand).

5. Employment protection and persistence of the initial labor-market condition

Figure 3 reports the effects of the unemployment rate at ages 15-24 on the subsequent unemployment rate, β, in the basic estimation equation (2) for countries with stronger employment protection and weaker employment protection. Note that the coefficients are estimated with the country-year specific fixed effects to capture the effect of the business cycle on all age groups. The country group with stronger EPL includes 10 countries with an EPL index above the median (EPL index =0.70), whereas the weaker group includes 10 countries below the mean. The graph indicates a significant variation of persistence across countries depending on the strength of EPL. In countries with stricter employment protection, a one percentage-point increase of the unemployment rate among 15-24 year-olds increases the unemployment rate by 0.200 percentage point among 25-29 year-olds, by 0.047 percentage point among 30-34 year-olds, 0.014 percentage point among 35-39 year-olds, and -0.034 percentage point by age 40. The estimated coefficients are statistically different from zero at the 5% significance level for the 25-29, 30-34, and 40-44 age groups. In countries with strong EPL, a young man who graduates from school in a bad year continues to suffer. In contrast, in countries with weak EPL, the unemployment rate for 15-24 year-olds does not affect subsequent unemployment rates. All of the estimated coefficients are statistically insignificant.

Table 3 reports the estimated coefficients of models (2) and (3). The model without the EPL index, reported in column (1), indicates that a cohort that experiences a one percentage-point higher unemployment rate among 15-24 year-olds suffers from a 0.144

percentage-point higher unemployment rate among 25-29 year-olds, 0.030 percentage point higher among 30-34 year-olds, 0.006 percentage point higher among 35-39 year-olds, and 0.027 percentage point lower among 40-44 year olds. The estimated coefficients indicate that the effect of the initial labor-market condition virtually fades away by age 35. The negative coefficients for age dummies 30-34, 35-39, and 40-44 imply that the unemployment rate decreases as a worker ages.

Column (2) reports the specification that allows for cross-country differences in persistence depending on the strictness of employment protection. Since the EPL index is introduced in the estimation equation after subtracting the mean value of the EPL index, the estimated coefficients for the interaction terms of the unemployment rate for 15-24 year-olds and age dummy variables indicate persistence of the initial labor-market condition evaluated at the sample mean of the EPL index. In a virtual country with the mean value of the EPL index, a worker who experiences a one percentage-point higher unemployment rate at ages 15-24 suffers from a 0.050 percentage-point higher unemployment rate at ages 25-29 and only 0.002 percentage point higher at ages 30-34. In a country with a mean EPL index, the effect of the labor-market condition at ages 15-24 quickly fades away by age 30. The large estimated coefficients for the interaction terms with the EPL index imply a significant heterogeneity of persistence across countries, depending on the degree of employment protection. For example, in the US, where the sample average of EPL index is 0.07, a one percentage-point increase of the unemployment effect in 15-24 year-olds *decreases* the unemployment rate in 25-29 year-olds by 0.19 percentage point, because $0.050 + 0.414 \times (0.07 - 0.65) = -0.19$. In contrast, in Portugal, where the mean EPL is1.21, the effect is 0.28 percentage point, because $0.050 + 0.414 \times (1.21 - 0.65) = 0.28$.

The persistence of the initial labor-market condition is stronger in countries with stricter employment protection. We argue that the relationship is causal by the following mechanism. A firm in a country with stricter employment protection stops hiring new workers instead of firing existing workers when the firm is hit by a negative shock, as shown by Kawaguchi and Murao (2012). The hiring freeze lowers the probability of new school graduates finding a job. Failure to find a job at youth deprives individuals of training opportunities and lowers the probability of employment in subsequent years because of the lack of human capital. Opportunities to exit from unemployment are limited in an economy with lower labor-market mobility.

Evidence shows that a youth who enters the labor market at a bad time subsequently suffers from this experience in countries with strict EPL. One might argue that the relationship is an artifact produced by EPL having a stronger impact on older, though there is no theoretical reason why stronger protection of aged workers increases persistence. To assess this possibility, Column (3) in Table 3 reports the specification that includes the interaction terms of EPL and age dummy variables. The estimated coefficients attenuate by about 5-10% compared with the coefficients reported in Column (2), but the result is not qualitatively different.[10]

The unemployment rate for 15-24 year-olds of a specific cohort presumably captures the labor-market condition at school graduation, but participation in the labor market could be an endogenous decision, because youth can stay in school to avoid graduating at a bad time (Kondo (2007) and Kahn (2010)). Thus youth's endogenous labor-force participation may well underestimate the actual labor-market condition at school

[10] We also tried a specification that allows for country × age group fixed effects. None of the coefficients for the terms involving EPL measure turns out to be statistically significant at the 10% level. This is because allowing for the fixed effects soaks up the large fraction of the variation in $u_{15-24ci} \times age_{ct} \times inst_i$.

graduation. The labor-force participation of other age groups could be endogenous as well. To assess the extent to which endogenous labor force participation affects our estimates based on the unemployment rate, we estimate identical models with the employment-population rate, as reported in Columns (4) to (6).

The result in Column (4) indicates that a cohort that experiences a one percentage-point higher employment population rate at ages 15-24 experiences a 0.12 percentage point higher employment population rate at ages 25-29. The persistence, however, completely fades away by ages 30-34. The result based on the employment population rate generally indicates a milder dependence of employment outcomes on the initial condition. The change of result is understandable, because a portion of youth not in employment at ages 15-24 is attending school, and better-educated people are more likely to be employed after graduation. The result based on the employment population rate is less straightforward to interpret because of the effect of schooling on subsequent employment probability. The results based on the employment population ratio, however, support the finding that the persistence of the initial labor-market condition is stronger in countries with stricter EPL, as reported in Columns (5) and (6).

One might argue that a cohort's population size relative to the size of the labor force causes a spurious correlation of labor-force status over time. A worker belonging to a larger cohort may be more likely to work (Shimer (2001)) or less likely to work (Korenman and Neumark (2000)). Regardless of the direction of the effect, the effect of cohort size on labor-force status might create a serial correlation of cohort-specific outcomes over time. To address this reasonable concern, we include (the cohort size / the total labor force size) as an additional independent variable. A 10 percentage-point larger population rate decreases the unemployment rate by 0.8 percentage point, and

the effect is statistically significant. Including the variable, however, does not change the effect of the initial unemployment rate on subsequent unemployment rates quantitatively. The dependence of persistence on institutional indexes also does not change quantitatively.

The empirical specification we employ in this section assumes that the country-year specific labor-market shock changes the unemployment rates of different age groups by the same percentage points. This assumption may be too restrictive, however, given a large difference in the baseline unemployment rates across age groups. To address this concern, we estimate a modified model of equation (4) that includes natural log of unemployment rates in the both sides of the equation. In this specification, a country-year specific shock to the labor market is assumed to have proportional effect on the unemployment rates of different ages. The conclusion of this section is robust in this alternative specification but we do not report the result of the regression for the sake of saving space. The stronger the EPL, the more persistent is the effect of unemployment rate at the labor market entry on subsequent unemployment rates.

6. Composite labor-market index and persistence of the initial labor-market condition

Although the analysis thus far has focused on the EPL as a proxy variable for labor market rigidity, many other labor market institution variables, which are available in OECD-CEP labor market institution indexes, may better capture the degree of labor-market rigidity, for example, strength of labor unions and extent of the unemployment insurance system.

Labor unions tend to advocate protection of employment and higher wages of existing

workers at the cost of reducing employment opportunities for potential entrants. Their efforts to protect insiders' interest at the cost of outsiders' generally reduces the turnover rate and lowers labor-market mobility (Lindbeck and Snower (2001)), which makes the effect of the initial labor-market condition on subsequent outcomes more persistent. As proxy variables to capture the strength of labor unions in employer-employee bargaining, we consider the union-coverage rate (the fraction of workers whose working conditions are determined by union agreement). Although union density could be an alternative measure, in some counties such as France, a much higher fraction of workers is covered by collective agreement between labor union and employers because of its legal system. To accurately capture the power of labor unions, we rely on the union-coverage rate. Union coverage is not recorded for Ireland so this country is dropped from the analysis sample.

Youth unemployment behavior is less likely to be directly affected by the unemployment insurance (UI) system, because workers must have contributed to the UI account for predetermined period to be eligible to receive the UI benefit and youth are less likely to have done so due to their shorter job careers. However, the generosity of unemployment insurance could decrease the matching efficiency in the labor market because of the low level job search intensity resulting from the moral hazard among the UI recipients. Employers in such an economy become reluctant to post job openings, and this reduces the chances of unemployed youth finding jobs. To approximate the generosity of unemployment insurance system, we use the benefit duration.

Two other labor-market institutions indexes are potentially important but are not incorporated in the analysis here because of an insufficient number of observations. The first variable is minimum wage. Higher minimum wage may reduce youth employment

opportunities and narrow the mid-career port of entry to a career job. The second variable is an index for active labor-market policies. Active labor-market policies, represented by services offered by public employment office, public job training, and employment subsidies, may increase the unemployed youths potential to acquire jobs and reduce the dependence of labor-market outcomes on initial labor-market conditions. The minimum wage variable and the active labor-market policy variable are recorded in the dataset relatively recently and including them in the analysis would reduce the sample size significantly. Therefore, we leave the assessment of these policies for future work.

The challenge to accommodate all labor-market institution indexes in the model is their high dimensionality. We have three commonly used labor-market institution indexes at hand and these indexes are correlated. Therefore, pinning down the effect of each institution on the persistence of the initial labor-market condition on subsequent outcomes is virtually impossible because of imprecise estimations. To overcome this difficulty, we construct a composite index for labor-market rigidity, using principal component analysis. Extracting the principal components from the 3 institution variables renders the first principal component as:

$$pc = 0.635epl + 0.740uc + 0.222bd$$

Where *epl* is the EPL index, *uc* is union coverage, and *bd* is the unemployment insurance benefit duration. The eigenvalue for the first principal component is 49.9% of the sum of the eigenvalues for all the principal components. The positive loading factors for all the variables imply that all variables are positively correlated with labor-market

rigidity; the higher the principal component, the more rigid is the labor market. Ireland is excluded from the analysis sample because the union coverage variable is missing. Using the first principal component as the composite labor-market institution, we estimate equation (5).

Table 4 reports the estimation results. Column (1) replicates the same result as in Table 3; the higher unemployment rate is at ages 15-24, the higher is the subsequent unemployment rate. Column (2) reports the specification that allows persistence of the initial labor-market condition dependent on the labor-market rigidity approximated by the first principal component (PC). The positive coefficient for the interaction term of the unemployment rate at ages 15-24 and CP implies that rigid labor-market institutions increase the persistence at ages 25-29. To understand the size of the interaction coefficient, we repeat the US-Portuguese comparison. In the US, where the benefit-replacement ratio is low relative to the twenty countries, with PC=-2.70, a one percentage-point higher unemployment rate at ages 15-24 is associated with a -0.123 percentage point lower unemployment rate at ages 25-29, because 0.125+0.092×(-2.70-0)=-0.123. Without a rigid labor market, there is virtually no persistence. In contrast, in Portugal, where PC=0.98, a one percentage-point higher unemployment rate at ages 15-24 is associated with a 0.215 percentage point higher unemployment rate at ages 25-29, because 0.125+0.092×(0.98-0)=0.215.

Consistent with our prior expectation, labor-market rigidity approximated by a principal component makes the persistence stronger. This estimation result is robust against the inclusion of the interaction terms of the principal component (*PC*) and age dummy variable (Column (3)) and usage of the employment-population rate (Columns (4) – (6)). A rigid labor market then makes the initial labor-market condition have a

persistent effect on subsequent outcomes.

7. Does the initial condition really matter?

We interpret the dependence of the unemployment rate at ages 25 and above on the cohort's unemployment rate at ages 15-24 as evidence of the persistence of the initial labor-market condition's effect on subsequent outcomes. One might worry that an unobserved country-cohort-specific factor, such as population size or the quality of education, could cause a spurious correlation. As discussed before, inclusion of (the cohort size / the total labor force size) does not quantitatively change the estimation results for the unemployment rate equation. We also confirm that the inclusion does not change the result of the employment-population ratio equation. These exercises, however, do not address the omitted variable bias caused by other factors. This problem is identical to the difficulty of distinguishing the state dependence, unobserved heterogeneity, and serial correlation of temporal shocks in the estimation of the labor supply model using micro data (Hyslop (1999)).

We address the concern for omitted variable bias caused by country-cohort specific unobserved heterogeneity by a falsification exercise; we regress the unemployment rate for ages 30 and above on the unemployment rate at ages 15-24 and 25-29. We estimate the following equation using age groups 30 and above as the sample:

$$u^a_{cyi} = u_{15-24ci} \times age_{cy}\delta^a + u_{25-29ci} \times age_{cy}\theta^a + age_{cy}\phi^a + d_{yi} + e^a_{cyi}. \qquad (6)$$

If the dependence of the current employment rate on the past unemployment rate is created through unobserved country-cohort specific effects, we expect $\delta^a = \theta^a$ to hold. Alternatively, if unobserved shock that is serially correlated renders the spurious state dependence, we expect $\delta^a < \theta^a$ to hold.

Table 5 reports the regression results using the unemployment rate and the employment-population rate as outcome variables. The result in Column (1) implies that a one percentage-point increase of the unemployment rate at ages 15-24 increases the unemployment rate at ages 30-34 by 0.049 percentage point, whereas that at ages 25-29 increases it by 0.027 percentage point. Furthermore, the impact of the unemployment rate at ages 15-24 on ages 35-39 diminishes from the impact on ages 35-39, as expected. The relationship is reversed for the unemployment rate at ages 40-44, but this is not informative, because the persistence almost completely disappears by age 40, as Table 3 indicates. In contrast, the effect of the unemployment rate at ages 25-29 has a negative impact on the unemployment rate at ages 35-39 and a positive impact on ages 40-44: a non-systematic pattern. The comparison of estimated coefficients for the unemployment rate at ages 15-24 and 25-29 suggests that the observed patterns are not a mere reflection of unobserved heterogeneity or the serial correlation of temporary shocks.

We cannot implement an effective falsification exercise for the employment population rate, because the cohort with a lower employment population rate at ages 15-24 arguably has higher educational attainment and subsequently experiences lower unemployment rates. Therefore, the unemployment rate at ages 30-34 is strongly associated with the rate at ages 25-29 but not with the rate at ages 15-24.

The falsification exercise suggests that the dependence of the unemployment rate at ages 25 and above on the unemployment rate at ages 15-24 is not a mere artifact by unobserved heterogeneity nor a serial correlation of unobserved shock; rather, it suggests that the persistence is produced by the effect of the initial labor-market condition on subsequent employment status.

8. Conclusion

Constructing cohort-based panel data of the unemployment history of 20 OECD countries between 1960 and 2010, this paper investigates the effect of the labor-market condition at school graduation, approximated by a cohort's unemployment rate at ages 15-24, on the unemployment rates of subsequent age groups. An analysis result indicates that a one percentage-point higher unemployment rate when individuals are 16-24 years-old leads to a 0.14 percentage point higher unemployment at ages 25-29 and a 0.03 percentage point higher unemployment at ages 30-34.

Building upon the rapidly expanding literature indicating the persistence of the effect of the labor-market condition at school graduation on subsequent outcomes based on micro data of each country, this paper proposes a method to estimate the persistence effect using widely available macro aggregates. Pooling uniformly defined variables from 20 countries with internationally comparable labor-institution indexes allows us to examine how the persistence depends on labor-market institutions, such as the strictness of EPL, the strength of labor union, or the generosity of unemployment insurance. The persistence is stronger in countries with stricter EPL or a more rigid labor market, approximated by a composite index. The findings in this paper suggest that moderating macroeconomic fluctuation is more important in countries with more persistent effects of labor-market entry conditions.

We select the age-specific unemployment rate and the employment-population ratio as outcome variables, because these variables are readily available by country-year-age cell. Not being in education, employment, or training (NEET) is a certainly important outcome, but the OECD Stat Extract does not carry detailed information on those who

are out of labor force. The data limitation does not allow us to comprehensively examine other important labor-market policies, such as minimum wage and active labor-market policies. A study of detailed youth outcomes using micro data across countries with a wider variety of policy variables is left for future research.

References

Aaronson, Daniel and Sara Christopher. 2004. "Employment growth in higher-paying sectors." *Chicago Fed Letter*, (Sep).

Alba-Ramirez, Alfonso. 1995. "Cross-country differences in cyclical variations of male teenage employment." *Economics Letters*, 48(3-4), 419-26.

Algan, Yann and Pierre Cahuc. 2009. "Civic virtue and labor market institutions." *American Economic Journal: Macroeconomics*, 1(1), 111-45.

Baccaro, Lucio and Diego Rei. 2007. "Institutional determinants of unemployment in OECD countries: Does the deregulatory view hold water?" *International Organization*, 61(03), 527-69.

Bertola, Giuseppe; Francine Blau and Lawrence Kahn. 2007. "Labor market institutions and demographic employment patterns." *Journal of Population Economics*, 20(4), 833-67.

Bertola, Giuseppe and Richard Rogerson. 1997. "Institutions and labor reallocation." *European Economic Review*, 41(6), 1147-71.

Blanchard, Olivier J. and Jean Tirole. 2008. "The joint design of unemployment insurance and employment protection: A first pass." *Journal of the European Economic Association*, 6(1), 45-77.

Blanchard, Olivier and Justin Wolfers. 2000. "The role of shocks and institutions in the rise of european unemployment: The aggregate evidence." *Economic Journal*, 110(462), C1-33.

Boeri, Tito. 1999. "Enforcement of employment security regulations, on-the-job search and

unemployment duration." *European Economic Review*, 43(1), 65-89.

Botero, Juan; Simeon Djankov; Rafael Porta; Florencio C. Lopez-De-Silanes and Andrei Shleifer. 2004. "The regulation of labor." *The Quarterly Journal of Economics*, 119(4), 1339-82.

Brunner, Beatrice and Andreas Kuhn. 2010. "The impact of labor market entry condition on initial job assignment, human capital accumulation, and wages." NRN working papers. The Austrian Center for Labor Economics and the Analysis of the Welfare State, Johannes Kepler University Linz, Austria.

Clark, Kim B. and Lawrence H. Summers. 1981. "Demographic differences in cyclical employment variation." *Journal of Human Resources*, 16(1), 61-79.

Devereux, Paul J. 2002. "Occupational upgrading and the business cycle." *Labour*, 16(3), 423-52.

Dickens, William T. and Robert K. Triest. 2012. "Potential effects of the great recession on the U.S. Labor market." *The B.E. Journal of Macroeconomics,* 12(3), 1-41.

Dustmann, Christian and Costas Meghir. 2005. "Wages, experience and seniority." *Review of Economic Studies*, 72(1), 77-108.

Gaini, Mathilde; Aude Leduc and Augustin Vicard. 2012. "A scarred generation? French evidence on young people entering into a tough labour market." Documents de Travail de la DESE - Working Papers of the DESE. Institut National de la Statistique et des Etudes Economiques, DESE.

Garibaldi, Pietro and Giovanni L. Violante. 2005. "The employment effects of severance payments with wage rigidities." *Economic Journal*, 115(506), 799-832.

Genda, Yuji; Ayako Kondo and Souichi Ohta. 2010. "Long-term effects of a recession at labor market entry in Japan and the United States." *Journal of Human Resources*, 45(1).

Gibbons, Robert and Michael Waldman. 2006. "Enriching a theory of wage and promotion dynamics inside firms." *Journal of Labor Economics*, 24(1), 59-108.

Gomme, Paul; Richard Rogerson; Peter Rupert and Randall Wright. 2005. "The business cycle and the life cycle," M. Gertler and K. Rogoff, *NBER Macroeconomics Annual 2004, volume 19.* National Bureau of Economic Research, Inc.

Hyslop, Dean R. 1999. "State dependence, serial correlation and heterogeneity in intertemporal labor force participation of married women." *Econometrica*, 67(6), 1255-94.

Jaimovich, Nir and Henry E. Siu. 2009. "The young, the old, and the restless: Demographics and business cycle volatility." *American Economic Review*, 99(3), 804-26.

Kahn, Lisa B. 2010. "The long-term labor market consequences of graduating from college in a bad economy." *Labour Economics*, 17(2), 303-16.

Kawaguchi, Daiji and Tetsushi Murao. 2012. "Who bears the cost of the business cycle? Labor-market institutions and volatility of the youth unemployment rate." *IZA Journal of Labor Policy*, 1(1), 10.

Kondo, Ayako. 2007. "Does the first job really matter? State dependency in employment status in Japan." *Journal of the Japanese and International Economies*, 21(3), 379-402.

Korenman, Sanders and David Neumark. 2000. "Cohort crowding and youth labor markets: a cross-national analysis," D. G. Blanchflower and R. B. Freeman, *Youth Employment and Joblessness in Advanced Countries.* University of Chicago Press.

Lazear, Edward P. 1990. "Job security provisions and employment." *The Quarterly Journal of Economics*, 105(3), 699-726.

Lindbeck, Assar and Dennis J. Snower. 2001. "Insiders versus outsiders." *Journal of Economic Perspectives*, 15(1), 165-88.

Liu, Kai; Kjell G. Salvanes and Erik Ø Sørensen. 2012. "Good skills in bad times: Cyclical skill mismatch and the long-term effects of graduating in a recession." Discussion Paper Series in Economics. Department of Economics, Norwegian School of Economics.

Luijkx, Ruud and Maarten H. J. Wolbers. 2009. "The effects of non-employment in early

work-life on subsequent employment chances of individuals in the netherlands." *European Sociological Review*, 25(6), 647-60.

McLaughlin, Kenneth J. and Mark Bils. 2001. "Interindustry mobility and the cyclical upgrading of labor." *Journal of Labor Economics*, 19(1), 94-135.

Neal, Derek. 1999. "The complexity of job mobility among young men." *Journal of Labor Economics*, 17(2), 237-61.

Neumark, David. 2002. "Youth labor markets in the United States: Shopping around vs. Staying put." *The Review of Economics and Statistics*, 84(3), 462-82.

Nickell, Stephen. 1997. "Unemployment and labor market rigidities: Europe versus North America." *Journal of Economic Perspectives*, 11(3), 55-74.

Nickell, William. 2006. "The CEP-OECD institutions data set (1960-2004)." CEP Discussion Papers. Centre for Economic Performance, LSE.

OECD. 2004. *OECD Employment Outlook*. Paris: OECD.

OECD. 2005. "The retirement effects of old-age pension and early retirement schemes in OECD countries." In *Economic Policy Reforms 2005: Going for Growth.* OECD Publishing.

Ohtake, Fumio and Takenori Inoki. 1997. "Cohort effects in the labor market (rodo-shijo ni okeru sedai koka)," Kazumi Asako, Naoyuki Yoshino and Shinichi Fukuda, *Gendai macro keizai bunseki - tenkanki no nihon keizai.* Tokyo: Tokyo University Press.

Okun, Arthur M. 1973. "Upward mobility in a high-pressure economy." *Brookings Papers on Economic Activity*, 4(1), 207-62.

Oreopoulos, Philip; Till von Wachter and Andrew Heisz. 2012. "The short- and long-term career effects of graduating in a recession." *American Economic Journal: Applied Economics*, 4(1), 1-29.

Oyer, Paul. 2006. "Initial labor market conditions and long-term outcomes for economists." *Journal of Economic Perspectives*, 20(3), 143-60.

Pedro, Portugal and Blanchard Olivier. 2001. "What hides behind an unemployment rate: Comparing portuguese and U.S. Labor markets." *American Economic Review*, 91(1), 187-207.

Quintini, Glenda; John P. Martin and Sébastien Martin. 2007. "The changing nature of the school-to-work transition process in OECD countries." IZA Discussion Papers. Institute for the Study of Labor (IZA).

Reder, Melvin W. 1955. "The theory of occupatoinal wage differentials." *American Economic Review*, 45(5), 833-52.

Rios-Rull, Jose-Victor. 1996. "Life-cycle economies and aggregate fluctuations." *Review of Economic Studies*, 63(3), 465-89.

Shimer, Robert. 2001. "The impact of young workers on the aggregate labor market." *The Quarterly Journal of Economics*, 116(3), 969-1007.

Tatsiramos, Konstantinos. 2010. "Job displacement and the transitions to re-employment and early retirement for non-employed older workers." *European Economic Review*, 54(4), 517-35.

Topel, Robert H. and Michael P. Ward. 1992. "Job mobility and the careers of young men." *The Quarterly Journal of Economics*, 107(2), 439-79.

United States General Accounting Office. 1990. "Preparing noncollege youth for employment in the U.S. and foreign countries." United States General Accounting Office.

von Wachter, Till and Stefan Bender. 2006. "In the right place at the wrong time: The role of firms and luck in young workers." *American Economic Review*, 96(5), 1679-705.

Yamaguchi, Shintaro. 2010. "The effect of match quality and specific experience on career decisions and wage growth." *Labour Economics*, 17(2), 407-23.

Figure 1　Cohort-specific unemployment rate in the US.

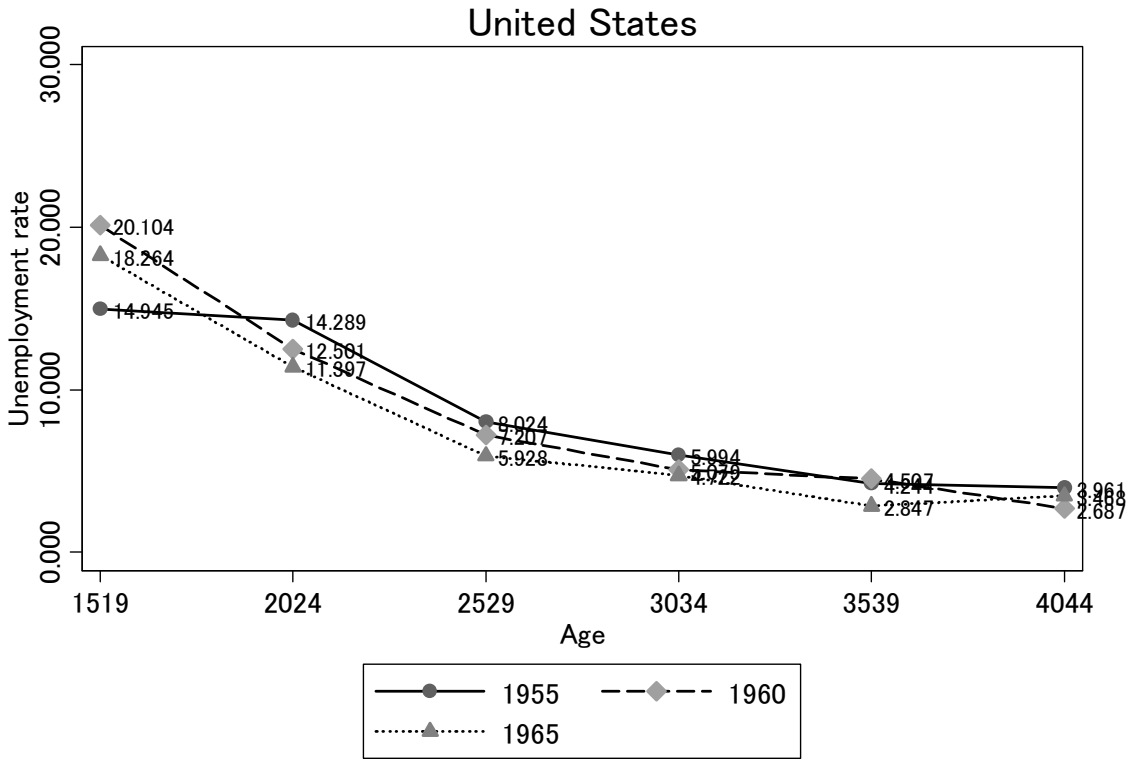


Figure 2 Cohort-specific unemployment rate in Italy

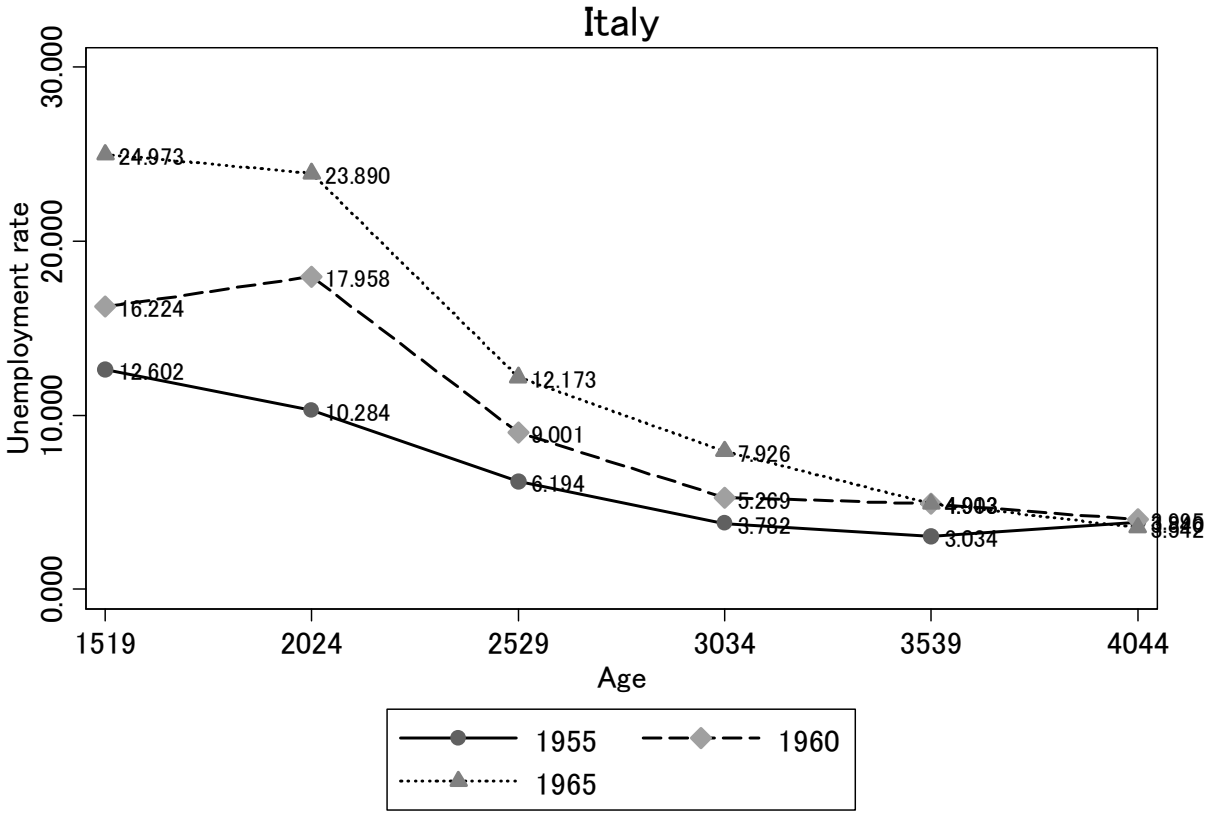
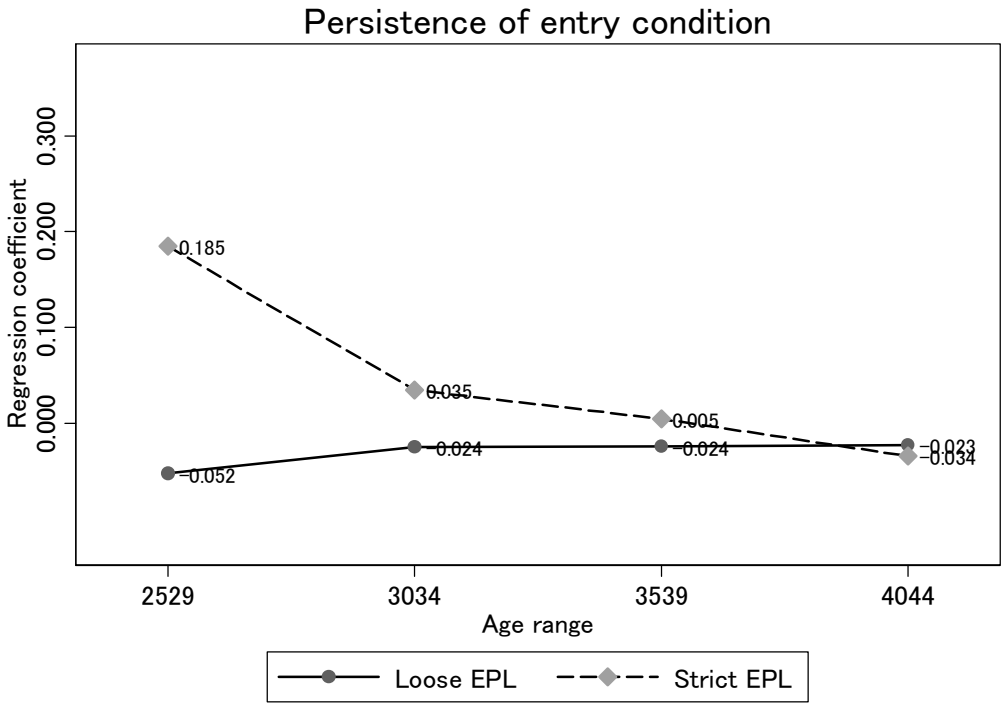


Figure 3 Persistence of entry condition and the Employment Protection Legislation



Note: Loose EPL (EPL index <0.7) includes Australia, Austria, Canada, Denmark, Ireland, Japan, New Zealand, Switzerland, United Kingdom and United States. Strict EPL includes (EPL index => 0.7) includes Belgium, Finland, France, Germany, Italy, Netherlands, Norway, Portugal and Spain, and Sweden.

Table 1 Descriptive statistics of 20 OECD countries, 1960-2010

Variable	Obs.	Mean	Std. Dev.	Min	Max
Unemployment rate	1,471	6.51	3.80	0.60	27.70
15-24	1,471	12.06	7.69	0.34	39.27
25-29	511	8.06	4.54	1.19	27.70
30-34	416	6.02	3.20	1.15	21.66
35-39	315	5.45	2.90	0.70	18.16
40-44	229	5.41	2.88	0.60	17.90
Employment rate	1,471	86.99	5.10	64.53	98.48
15-24	1,471	55.82	11.71	26.80	78.64
25-29	511	83.57	5.73	64.53	94.31
30-34	416	88.64	3.71	74.01	98.48
35-39	315	89.24	3.37	77.82	97.25
40-44	229	88.55	3.55	77.32	96.72
Employment protection legislation	20	0.65	0.34	0.07	1.21
Union coverage	19	69.36	23.44	20.68	98.17
Benefit duration	20	0.43	0.33	0.00	1.02
First principal component	19	0.00	1.20	-2.70	1.22

Note: Benefit duration is defined as 0.6*brr23/brr1 + 0.4*brr45/brr1, where brr1, brr23, and brr45 is a UI replacement ratio for the first year, second and third years, and fourth and fifth years, respectively. Union coverage is not available for Ireland.

Table 2 Average institution index during the sample period, 20 OECD countries, 1960-2010

Country	EPL	Union coverage	Benefit duration	First principal component
Australia	0.33	83.57	1.02	0.22
Austria	0.58	98.17	0.52	0.81
Belgium	0.89	88.04	0.85	1.22
Canada	0.27	35.60	0.00	-2.00
Denmark	0.65	73.50	0.66	0.24
Finland	0.74	94.29	0.44	0.91
France	0.81	88.85	0.38	0.83
Germany	0.86	83.77	0.60	0.89
Ireland	0.25	N.A.	0.67	N.A.
Italy	1.07	85.04	0.11	0.99
Japan	0.68	23.98	0.00	-1.64
Netherlands	0.85	83.44	0.53	0.82
New Zealand	0.34	50.87	1.02	-0.77
Norway	0.94	69.31	0.35	0.43
Portugal	1.21	75.12	0.20	0.98
Spain	1.20	72.59	0.20	0.89
Sweden	0.71	86.45	0.03	0.36
Switzerland	0.34	50.35	0.08	-1.37
United Kingdom	0.18	54.26	0.72	-1.13
United States	0.07	20.68	0.17	-2.70

Table 3 Employment protection and the hysteresis of initial labor-market condition on subsequent outcomes, 20 OECD countries, 1960-2010

	(1)	(2)	(3)	(4)	(5)	(6)
Labor force measure	Unemployment rate			Employment rate		
UE / Emp rate 15-24	0.144	0.050	0.056	0.120	0.047	-0.003
(Reference: Age 25-29)	(0.059)	(0.026)	(0.028)	(0.070)	(0.060)	(0.037)
UE / Emp rate 15-24	-0.114	-0.048	-0.055	-0.121	-0.086	-0.016
×Age 30-34	(0.034)	(0.016)	(0.017)	(0.072)	(0.054)	(0.042)
UE / Emp rate 15-24	-0.138	-0.056	-0.067	-0.167	-0.124	-0.031
×Age 35-39	(0.045)	(0.022)	(0.023)	(0.104)	(0.076)	(0.060)
UE / Emp rate 15-24	-0.171	-0.070	-0.080	-0.204	-0.154	-0.043
×Age 40-44	(0.048)	(0.025)	(0.027)	(0.120)	(0.085)	(0.064)
Age 30-34	-2.071	-2.051	-2.053	5.233	4.878	4.970
	(0.149)	(0.107)	(0.090)	(0.577)	(0.596)	(0.432)
Age 35-39	-2.921	-2.930	-2.936	6.510	6.120	6.183
	(0.215)	(0.165)	(0.139)	(0.837)	(0.760)	(0.581)
Age 40-44	-3.242	-3.230	-3.242	6.464	5.959	5.992
	(0.258)	(0.204)	(0.184)	(1.008)	(0.824)	(0.671)
UE / Emp rate 15-24	-	0.414	0.350	-	0.506	0.266
× (EPL-$\overline{\text{EPL}}$)		(0.076)	(0.082)		(0.225)	(0.141)
UE / Emp rate 15-24	-	-0.286	-0.230	-	-0.250	-0.276
×Age 30-34×(EPL-$\overline{\text{EPL}}$)		(0.065)	(0.081)		(0.207)	(0.167)
UE / Emp rate 15-24	-	-0.337	-0.263	-	-0.282	-0.343
×Age 35-39×(EPL-$\overline{\text{EPL}}$)		(0.094)	(0.113)		(0.286)	(0.255)
UE / Emp rate 15-24	-	-0.401	-0.333	-	-0.341	-0.422
×Age 40-44×(EPL-$\overline{\text{EPL}}$)		(0.094)	(0.101)		(0.295)	(0.286)
Constant	8.186	8.159	8.176	83.217	83.971	83.379
	(0.116)	(0.084)	(0.073)	(0.461)	(0.477)	(0.355)
Age dummies×(EPL-$\overline{\text{EPL}}$)	No	No	Yes	No	No	Yes
Year × country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.72	0.80	0.80	0.74	0.78	0.83
N	1,471	1,471	1,471	1,471	1,471	1,471

Note: Standard errors robust against country-level clustering are reported in parentheses.

Table 4 Composite labor market index and the hysteresis of initial labor-market condition on subsequent outcomes, 20 OECD countries, 1960-2010

	(1)	(2)	(3)	(4)	(5)	(6)
Labor force measure	Unemployment rate			Employment rate		
UE rate / Emp rate 15-24	0.144	0.125	0.119	0.120	0.100	0.064
(Reference: Age 25-29)	(0.059)	(0.036)	(0.030)	(0.070)	(0.067)	(0.047)
UE rate / Emp rate 15-24	-0.114	-0.101	-0.094	-0.121	-0.117	-0.077
×Age 30-34	(0.034)	(0.027)	(0.019)	(0.072)	(0.067)	(0.051)
UE rate / Emp rate 15-24	-0.138	-0.116	-0.108	-0.167	-0.155	-0.110
×Age 35-39	(0.045)	(0.037)	(0.027)	(0.104)	(0.097)	(0.075)
UE rate / Emp rate 15-24	-0.171	-0.132	-0.126	-0.204	-0.194	-0.146
×Age 40-44	(0.048)	(0.039)	(0.029)	(0.120)	(0.108)	(0.082)
Age 30-34	-2.071	-2.018	-2.051	5.233	5.234	5.368
	(0.149)	(0.124)	(0.102)	(0.577)	(0.607)	(0.450)
Age 35-39	-2.921	-2.830	-2.890	6.510	6.494	6.732
	(0.215)	(0.188)	(0.147)	(0.837)	(0.831)	(0.649)
Age 40-44	-3.242	-3.085	-3.156	6.464	6.400	6.709
	(0.258)	(0.205)	(0.168)	(1.008)	(0.940)	(0.842)
UE rate / Emp rate 15-24	-	0.092	0.077	-	0.110	0.055
×(PC-$\overline{PC}$)		(0.033)	(0.027)		(0.069)	(0.036)
UE rate / Emp rate 15-24	-	-0.063	-0.059	-	-0.034	-0.047
×Age 30-34×(PC-$\overline{PC}$)		(0.027)	(0.018)		(0.063)	(0.039)
UE rate / Emp rate 15-24	-	-0.079	-0.076	-	-0.040	-0.057
×Age 35-39×(PC-$\overline{PC}$)		(0.036)	(0.024)		(0.080)	(0.053)
UE rate / Emp rate 15-24	-	-0.101	-0.096	-	-0.035	-0.055
×Age 40-44×(PC-$\overline{PC}$)		(0.035)	(0.023)		(0.081)	(0.059)
Constant	8.186	7.969	8.000	83.217	83.682	83.354
	(0.116)	(0.090)	(0.071)	(0.461)	(0.453)	(0.378)
Age dummies×PC	No	No	Yes	No	No	Yes
Year × country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.72	0.78	0.80	0.74	0.77	0.81
N	1,471	1,406	1,406	1,471	1,406	1,406

Table 5　Particular effect of the initial labor market condition on subsequent outcomes, 20 OECD countries, 1960-2010

	(1)
Labor force measure	Unemployment rate
UE / Emp rate 15-24	0.049
(Reference: Age 30-34)	(0.021)
UE / Emp rate 15-24×Age 35-39	-0.020
	(0.020)
UE / Emp rate 15-24×Age 40-44	-0.057
	(0.028)
UE / Emp rate 25-29	0.027
(Reference: Age 30-34)	(0.024)
UE / Emp rate 25-29×Age 35-39	-0.045
	(0.031)
UE / Emp rate 25-29×Age 40-44	-0.009
	(0.034)
Age 35-39	-0.829
	(0.069)
Age 40-44	-1.098
	(0.125)
Constant	6.156
	(0.046)
Year×country fixed effects	Yes
R2	0.60
N	939