Labor market institutions and the persistence of cohort specific unemployment rate[1]

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Abstract

Graduating from a school in an adverse economic condition persistently harms a worker's subsequent employment opportunity. Analysis of panel data from OECD countries 1960-2010 finds that a worker who experiences one percentage point higher unemployment rate in 16-24 year-olds experience 0.14 percentage points higher unemployment in 25-29, 0.03 percentage points higher in 30-34. The persistence is stronger in a country with stricter employment protection legislation and generous unemployment insurance payment. Moderating macroeconomic fluctuation is more important in countries with stronger persistence of labor market entry condition on subsequent outcome.

Keywords: Unemployment; graduation; cohort analysis; persistence

JEL classification: E24; J64; J65; K31

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Introduction

Negative shock to the labor market after the financial crisis 2008 has sharply increased youth unemployment rate in many developed countries. How serious could this problem be? Optimist argues that an economic recovery quickly reduces youth unemployment rate because their unemployment rate is more responsible to business cycle.[3] On the contrary, an emerging literature points out that unemployment experience in youth tends to have lasting effects on employment and earnings in later life because unemployment at youth deprives the opportunities to accumulate human capital on a career jobs (von Wachter and Bender (2006), Oreopoulos et al. (2012)). The strength of the scarring effect could be stronger in an economy where the port of entry to a career job is limited to the timing of school graduation. Indeed, Genda et al. (2010) found that adverse labor market environment at school graduation has more detrimental impact on employment status in later life in Japan compared with the US. The well-established school-to-work transition and well-organized internal career development system of Japan adversely affects a worker who fails to find a career job at the time of school graduation.

Figure 1 illustrates the life cycle unemployment rates by birth year cohort in the US. A person born in 1965 had lower probability to be unemployed in 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 in his 15-24 year-olds marginally persists when he is 25-29. In the age 30-34, the 1965 cohort and the 1965 cohort share the same unemployment. The figure for Italy in Figure 2 is contrasting to the US figure. The 1960 cohort, who had lower

[3] Previous literature shows that the youths' unemployment rate is more cyclically sensitive than that of adults (Clark and Summers (1981), Alba-Ramirez (1995), Rios-Rull (1996), Gomme et al. (2005), Bertola et al. (2007) and Jaimovich and Siu (2009)).

probability to be unemployed than the 1965 cohort in ages 15-19 and 20-24, continued to have lower unemployment probability in ages 25-29. The comparison of the US and Italy seems to suggest more significant scarring effect in Italy but nothing definitive can be said because the contrast could be a product of growing unemployment rate in Italy in recent years. Therefore controlling for cross country differences in the age specific unemployment rate and the temporary business cycle is indispensable to reach a definitive conclusion.

Figure 1　Initial adverse effect quickly fades away in the US.

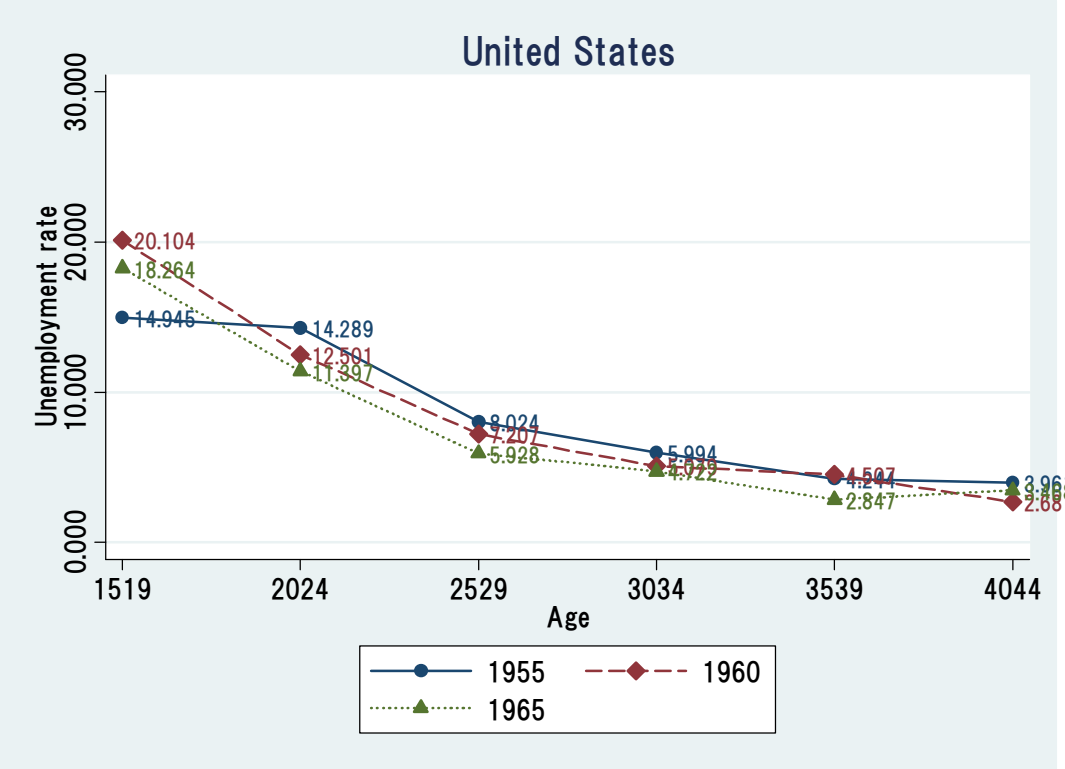
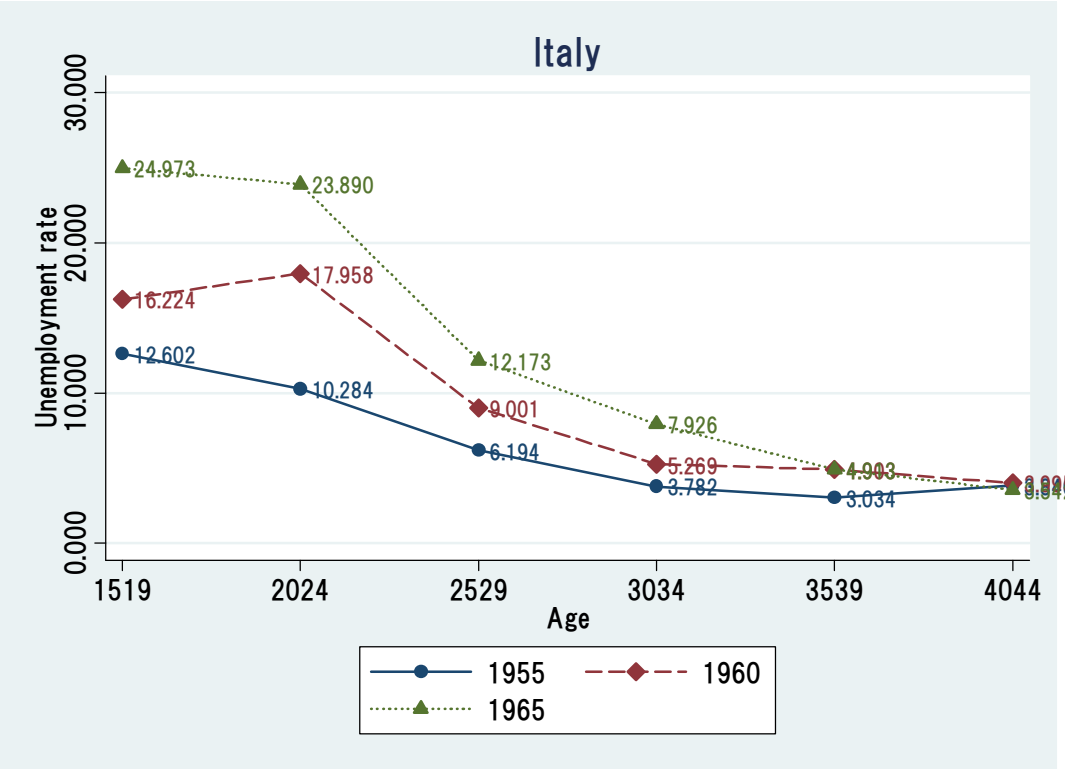


Figure 2 Initial adverse effect persists in Italy



The strength of scarring effect in an economy has important implications for the fiscal and monetary authorities because, with a strong scarring effect, a transitory unemployment at youth easily turns into permanent unemployment (Dickens and Triest (2012)). In such an economy, the benefit of smoothing short term volatility could be high. Regardless of the rich implications of scarring effect to policy makers, the studies on the scarring effect are limited to careful studies based on micro data from several developed countries as review in the next section. The difference of scarring effect across economies and its dependence on labor market institutions is largely unknown to date.

Against this background, this paper measures the heterogeneity of scarring effect across economies using cross-country panel data of OECD countries between 1960 and 2010 by paying attention to a life time unemployment experience of a specific cohort.

Specifically, the regression coefficient of cohort-year specific unemployment rate on the cohort's unemployment rate at 16-24 identifies the strength of the dependence. In the estimation we control for the country specific age profiles of unemployment rate and 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. The more rigid the labor market, the stronger the dependence, we expect.

The analysis based on pooling 20 OECD countries reveals that 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. One percentage point higher unemployment rate at 16-24 increases the unemployment rate by 0.142 percentage points at 25-29, 0.033 percentage points at 30-34, 0.012 percentage points at 35-39. The persistence of unemployment rate at 16-24 on subsequent ages is stronger in countries with stricter employment protection legislation. In countries with stricter employment protection index than the median, the persistence coefficient is 0.213 at 25-29, whereas in the countries with looser employment protection than the median, the coefficient is -0.028. The stronger persistence effect in countries with stricter employment protection is explained by the fact that the port of entry to a career job is relatively limited to the timing of school graduation in these countries. The generosity of unemployment insurance system, represented by the benefit replacement ratio, increases the persistent in a significant way.

The persistence of labor market condition upon school graduation

The labor market condition at school graduation potentially has persistent effect on

subsequent labor market outcomes: 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 ended job. Output of the career job depends heavily on the worker's skill while output of the dead ended job does not. The relationship between the output and the worker's skill creates selection of a skilled worker into a career job and an unskilled worker in a dead ended job. Evidence suggests that the demand for the output of a career job is more sensitive to business cycle;[4] therefore the fraction of workers assigned to career job increases as business expands. A worker assigned to a career job accumulates skill and enjoy wage growth. Meanwhile, the mobility between the career job and the dead ended job is limited because of occupational specificity of skill.

Gibbons and Waldman (2006) does not directly predict the persistence of labor market condition at school graduation on subsequent career development because the port of entry to a job is not necessarily limited at school graduation. While the port of entry to a career job is not limited to the timing of school graduation, in the labor market where an employer-employee match is difficult to resolve because of high firing cost, an employer carefully selects a worker who has high potential for good match. An important institutional setting that facilitates a good match between an employer and an employee, particularly among unskilled worker, is institutions for school-to-work transition: information sharing between firms and high schools in Japan and the combination of vocational education and apprenticeship system in Germany (United States General Accounting Office (1990), Neumark (2002) and Genda, Kondo and Ohta

[4] 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)).

(2010)). School graduation is more or less the time when the port of entry is wide open.

Even in an occupation that requires general skill and individual productivity is public information such as economists, the initial placement, partly determined by business cycle, plays a significant role in their career progression (Oyer (2006)). The friction in labor market seems to be lowered at the timing of school graduation because many employers and employees enter a labor market and interact under institutional arrangements for the matching process. In sum, across occupations, the timing of school graduation is an important port of entry to a career job.

Researchers around the world have accumulated a knowledge how strong is the persistence of initial labor market condition on subsequent outcomes. Table 1 summarized the literature. All the results, except for Gaini et al. (2012) for France, indicate significant effects of initial labor market condition on subsequent outcomes. A worker who starts his career in an adverse economic condition, typically approximated by high unemployment rate, is likely to earn less and less likely to work. The persistence of initial labor market condition could differ across countries, however, the comparison across countries is difficult because different studies use different outcome variables, initial condition variables, and different age ranges. Notwithstanding the difficulty in the international comparison, Genda, Kondo and Ohta (2010) applies the same estimation methods to comparable Japanese and US datasets and reveals stronger persistence in Japan than in the US. The stronger persistence of initial labor market condition on subsequent outcomes in Japan than in the US is a 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 evidence from more countries.

Table 1 International evidence on the persistence of the initial labor market condition on subsequent outcomes

Study	Country	Entry Year	Data	Sample	Labor Market Condition at Entry	Outcome	Result
Boehm and Watzinger (2012)	The US	1955-1994	AEA List of Doctoral Dissertation	Ph.D. Economists	Unemployment rate	Subsequent publications	Economists graduating in a recession are significantly more productive than economists graduating in a boom
Brunner and Kuhn (2010)	Austria	1978-2000	Social security database	Private sector workers	Unemployment rate	Subsequent real daily wage	1% point increase in the initial unemployment rate is associated with 6.5% less lifetime earnings.
Gaini, Leduc and Vicard (2012)	France	1982-2007	LFS	All workers	Unemployment rate	Subsequent earnings and employment status	No long term effect on wage and employment
Genda, Kondo and Ohta (2010)	Japan; the US		LFS(Japan); CPS(US)	College and High school graduates	Unemployment rate	Subsequent earnings and employment status	Entry condition matters in Japan while does not in the US
Kahn (2010)	the US	1979-1989	NLSY	College graduates	College unemployment rate	Wage; tenure; occupation quality; labor supply	Macroeconomic condition at entry has large, negative and persistent effects
Kondo (2007)	Japan	1985-1997	Japan General Social Surveys	All workers	Initial job: regular or non-regular, instrumented by job opening rate.	Current job: regular or non-regular	Initial non-regular has 40-50% less chance of having regular
Liu et al. (2012)	Norway	1980-2006	Administrative	College	Unemployment rate	Subsequent skill	Entry condition has a declining but

			register	graduates		premium	persistent effect on the probability of mismatch early in their careers.
Neumark (2002)	the US	1979-1986	NLSY	All workers	Longest tenure and number of jobs in the initial five-year post-schooling period, instrumented by unemployment rate.	Adult wage	Entry job stability has substantial positive effects on adult wage.
Ohtake and Inoki (1997)	Japan	1933-1992	Basic Survey on Wage Structure	Male regular workers	Number of newly employed graduates, Lagged labor market tightness	Cohort effect of {mean, variance} of {wage, tenure, firm size}	Entry condition has a persistent effect on a cohort's wage.
Oreopoulos, Wachter and Heisz (2012)	Canada	1976-1995	Administrative EE matched data	College graduates	Unemployment rate	Subsequent earnings and employment status	Entry condition matters substantially and unequally depending on the college prestige.

Labor market institutions and scarring effect

A worker graduating from a school in a recession year is less likely to find a job and has a higher probability to be unemployed. This initial unemployment experience may deprive of the opportunity for on-the-job training and the lack of skill accumulation may hinder the youth to find a job subsequently. The initial unemployment experience may cause the subsequent unemployment: the scarring effect. The basic model that captures the scarring effect, which allows decay of the effect, is specified as

$$u^a_{cyi} = u_{15-24ci} \times age_{cy}\beta + age_{cy}\gamma + d_{yi} + e^a_{cyi} \qquad (1)$$

where u is the unemployment rate, c is the cohort index, y is the year index, i is the country index, age is a dummy variable vector that includes dummy variables corresponding to 25-29, 30-34, 35-39, 40-44. Each coefficient in β^{ca} captures the persistence of initial labor market condition on each age group. Coefficients in β^a summarize the difference of unemployment rate across age groups over years. The unobserved macroeconomic shock that affects all age groups in year y, country i is captured by d_{yi}, which is treated by country-year fixed effects in the estimation.

The speed the initial labor market condition decay could differ across countries depending on labor market institutions. If the port of entry to a career job is concentrated around the timing of school graduation and standardized occupational credentials is not established in the labor market as in Japan, the initial labor market condition may well have persistent effect on subsequent labor market outcomes. On the contrary, in an economy where a young worker typically changes several employers to find a better matched employer as in the US (Topel and Ward (1992)) or the credential of occupational skill is well established as in Germany (Dustmann and Meghir (2005)), a

worker who initially faces an adverse labor market condition may quickly recover in subsequent years through finding a proper job. The degree of the persistence of initial labor market condition on subsequent outcomes seems to depend on labor market institutions.

As a labor market institution measure to capture the potential mobility of a worker across firms, we focus on the index for the degree of employment protection. Exploiting the index for employment protection, we are not interested in the effect of employment protection per se, but rather interested in capturing the labor market rigidity by using the measure. In addition, we consider the generosity of unemployment insurance as the determinant for the mobility of a worker across firms.

Extending the basic model slightly, estimating the following model captures how the persistence of the scarring effect depends on labor market institution such as the employment protection legislation or the unemployment insurance.

$$u^a_{cyi} = u_{15-24ci} \times age_{cy} \times inst_i \beta + age_{cy} \times inst_i \gamma + d_{yi} + e^a_{cyi} \qquad (2)$$

where $inst_i$ is the sample period average of institution index of country i. We use the sample period average of institution index because the indexes are almost time invariant within a country and we are interested in cross country difference of the persistence of the initial labor market condition. As the institution variables, we pick up the strictness of employment protection and the generously of unemployment insurance as determinants for the potential mobility of a worker across firms.

Data

We build the 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 the issues related to early retirement in some countries due to incentives created by disability insurance and pension systems (Romain (2003), Tatsiramos (2010)).

The employment protection legislation index and the benefit replacement ratio index 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 legal employment protection and an index for the generosity of unemployment insurance. After 2004, employment protection legislation (EPL) is extended based on the OECD labor-market statistics database for the period until 2010. The benefit replacement ratio of unemployment insurance is extended to 2007 based on Benefits and Wages: OECD Indicators. For benefit replacement ratio after 2007, the value of 2007 is extrapolated.

Legal employment protection and unemployment insurance are two major alternative institutions to offer insurance against a negative labor market shock as argued by Blanchard and Tirole (2008) and Algan and Cahuc (2009).[5] A strict employment protection reduces a worker's mobility between firms while generous unemployment insurance increases it. Employment protection legislation and unemployment insurance, therefore, may well capture the mobility of workers in a labor market. Indeed, Kawaguchi and Murao (2012) finds that negative macroeconomic shock increases youth

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

unemployment rate in countries with stricter employment protection legislation and stricter unemployment insurance system. Strict employment protection legislation insulates older workers from a negative shock but younger workers experience a big increase of unemployment rate, on the contrary, generous unemployment system increases unemployment rate of all ages so that workers in all age ranges share the burden of the business cycle. Kawaguchi and Murao (2012) also find that labor market institution indexes other than the employment protection index and the generosity index of unemployment insurance system do not affect the relationship between a macroeconomic shock and the fluctuation of age-specific unemployment rates.

Based on findings that the employment protection index and the generosity index of unemployment insurance are important indexes, regression analyses in this study are conducted with the two indexes. The OECD employment protection index is constructed from 21 items of three different aspects of employment protection: (1) protection against individual dismissal, (2) additional costs for collective dismissal, and (3) the regulation of temporary contracts.[6] As a measure of the generosity of unemployment contract, the OECD measures replacement rates by computing the total benefit payable in a year of unemployment for a variety of "typical" worker and household cases.[7] The data in Table

[6] 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. When an employer dismisses a large number of workers at one time, some countries impose additional costs for collective dismissals such as additional delays, costs or notification procedures. Regulation of temporary contracts quantifies 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 regulation governing the establishment and operation of temporary work agencies and requirements for agency workers to receive the same pay and/or conditions as equivalent workers in the user firm.

[7] These cases include: i) three different durations of an unemployment spell for a person with a long record of previous employment: the first year, the second and third years, and the fourth and fifth years of unemployment; ii) three family and income

1 are gross replacement rates, i.e. they are not adjusted for the effects of taxation.

Table 2 Descriptive statistics of 20 OECD countries 1960-2010

Variable	Obs.	Mean	Std. Dev.	Min	Max
Unemployment rate	1,845	6.87	3.31	1.34	21.21
15-24	1,845	11.21	7.53	0.34	39.27
25-29	521	8.04	4.50	1.190	27.70
30-34	431	5.96	3.18	1.15	21.66
35-39	331	5.35	2.87	0.70	18.16
40-44	245	5.23	2.87	0.60	17.90
Employment rate	1,845	77.71	5.92	63.15	90.20
15-24	1,845	56.50	11.56	26.80	78.64
25-29	521	83.63	5.69	64.53	94.31
30-34	431	88.74	3.70	74.01	98.48
35-39	331	89.36	3.34	77.82	97.25
40-44	245	88.74	3.52	77.32	96.72
Employment protection legislation	1,845	0.63	0.30	0.07	1.23
Benefit replacement ratio	1,845	32.05	12.69	12	62

Table 2 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 become smaller because fewer cohorts have the unemployment rate both at the older age and at ages 15-24. The unemployment rate reduces as workers age until ages 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 institutional index, we use

situations: a single person, a married person with a dependent spouse, and a married person with a spouse in work; and iii) two different levels of previous earnings in work: average earnings and two-thirds of average earning. In all cases, the replacement rates refer to a 40-year-old worker who is considered a good approximation to the average situation of an unemployed person.

average index over years within a country to exploit only cross country variation, because the institutional index does not change much over the sample period within a country and the revision of an index seems to capture both actual institutional change and the method of measurement. The employment protection index ranges from 0.07 (the US) to 1.23 (Portugal). The average benefit replacement ratio ranges from 12 (Japan) to 62 (Denmark). Table 3 tabulates the average of each country's index over the period 1960 and 2010

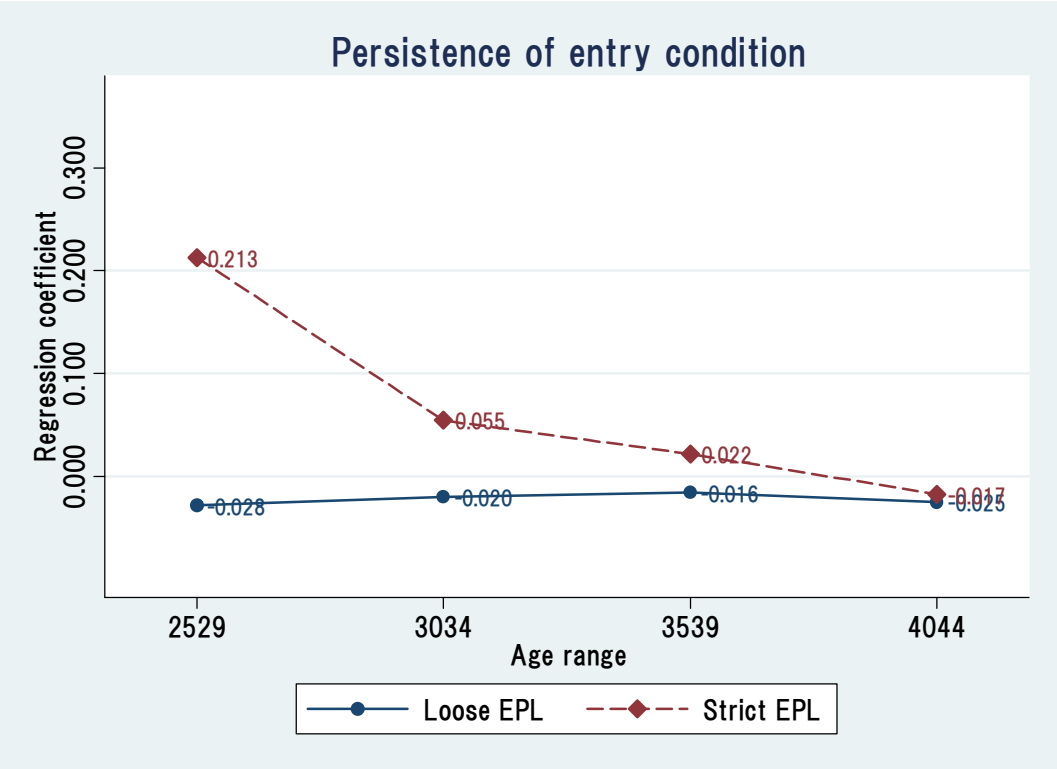
Table 3 Average institution index during the sample period, 20 OECD countries, 1960-2010

Country	Employment legislation index	Benefit replacement ratio
Austria	.73	33
Australia	.40	25
Belgium	.73	39
Canada	.27	15
Denmark	.47	62
Finland	.70	34
France	1.00	37
Germany	.83	27
Ireland	.30	29
Italy	.86	34
Japan	.60	12
Netherlands	.70	52
New Zealand	.50	29
Norway	.87	41
Portugal	1.23	45
Spain	.97	35
Sweden	.73	24
Switzerland	.37	37
United States	.07	14
United Kingdom	.23	17

Employment protection and the persistence of initial labor market condition

Figure 3 reports the effects of unemployment rate at 15-24 on subsequent unemployment rate, β^{ca}, in the basic estimation equation (1) 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 business cycle on all age groups. The country group with stronger employment protection includes 6 countries with employment protection index above the mean (EPL index = 0.8); whereas the weaker group includes 14 countries below the mean. The graph indicates a significant variation of the persistence across countries depending on the strength of employment protection legislation. In countries with stricter employment protection, 1 percentage point increase of unemployment rate in 15-24 year-olds increases the unemployment rate by 0.213 percentage points in 25-29 year-olds, by 0.055 percentage points in 30-34 year-olds, 0.022 percentage points in 35-39 year-olds, and -0.017 percentage points by age 40. The estimated coefficients are statistically different from zero for 25-29 and 30-34 years-old. In countries with strong employment protection, a young man who graduates from a school in bad year continues to suffer. On the contrary, in the countries with weak employment protection, the unemployment rate in 15-24 year-olds does not affect subsequent unemployment rates. All of the estimated coefficients, except for 25-29 years-old, are statistically insignificant.

Figure 3 Unemployment rate at 15-24 persists when employment protection is strong.



Note: Loose EPL (EPL index <0.7) includes Australia, Canada, Denmark, Finland, Ireland, Japan, Netherlands, New Zealand, Switzerland, United Kingdom and United States. Strict EPL includes (EPL index => 0.8) includes Austria, Belgium, France, Germany, Italy, Norway, Portugal and Spain and Sweden.

Table 4 The initial labor market condition affects subsequent outcomes, stricter employment protection reinforces the hysteresis, 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	0.072	0.074	0.120	0.072	0.024
(Reference: Age 25-29)	(0.010)	(0.010)	(0.009)	(0.015)	(0.016)	(0.015)
UE rate / Emp rate 15-24	-0.114	-0.060	-0.065	-0.121	-0.106	-0.049
×Age 30-34	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.013)
UE rate / Emp rate 15-24	-0.138	-0.074	-0.081	-0.167	-0.149	-0.078
×Age 35-39	(0.011)	(0.011)	(0.011)	(0.015)	(0.015)	(0.015)
UE rate / Emp rate 15-24	-0.171	-0.092	-0.099	-0.204	-0.187	-0.099
×Age 40-44	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.018)
Age 30-34	-2.071	-2.076	-2.082	5.233	5.068	5.175
	(0.074)	(0.066)	(0.065)	(0.150)	(0.158)	(0.145)
Age 35-39	-2.921	-2.955	-2.969	6.510	6.385	6.522
	(0.085)	(0.076)	(0.075)	(0.179)	(0.189)	(0.174)
Age 40-44	-3.242	-3.281	-3.299	6.464	6.306	6.452
	(0.099)	(0.087)	(0.086)	(0.211)	(0.222)	(0.206)
UE rate / Emp rate 15-24	-	0.518	0.459	-	0.366	0.171
× (EPL-$\overline{\text{EPL}}$)		(0.032)	(0.034)		(0.051)	(0.049)
UE rate / Emp rate 15-24	-	-0.383	-0.333	-	-0.149	-0.227
×Age 30-34×(EPL-$\overline{\text{EPL}}$)		(0.036)	(0.038)		(0.049)	(0.046)
UE rate / Emp rate 15-24	-	-0.434	-0.375	-	-0.133	-0.276
×Age 35-39×(EPL-$\overline{\text{EPL}}$)		(0.041)	(0.042)		(0.057)	(0.055)
UE rate / Emp rate 15-24	-	-0.523	-0.462	-	-0.173	-0.358
×Age 40-44×(EPL-$\overline{\text{EPL}}$)		(0.048)	(0.049)		(0.065)	(0.069)
Constant	8.186	8.204	8.210	83.217	83.622	83.200
	(0.052)	(0.046)	(0.045)	(0.108)	(0.121)	(0.115)
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	0.79	0.79	0.74	0.76	0.80
N	1,471	1,471	1,471	1,471	1,471	1,471

Table 4 reports the estimated coefficients of models (1) and (2). The model without the

index of employment protection legislation (EPL), reported in column (1), indicates that a cohort that experiences one percentage point higher unemployment rate in 15-24 year-olds suffers from 0.144 percentage points higher unemployment rate in 25-29 year-olds, 0.030 percentage points in 30-34 year-olds, 0.006 percentage points in 35-39 year-olds, -0.027 percentage points in 40-44. The estimated coefficients indicate that the effect of the initial labor market condition virtually fade away by age 35. The negative coefficients for age dummies 30-34, 35-39 and 40-44 implies that the unemployment rate decreases as a worker ages.

Column (2) reports the specification that allows for the cross country difference in the persistence depending on the strictness of employment protection. Since the EPL index is introduced in the estimation equation after subtracting the mean value of EPL index, the estimated coefficients for the interaction terms of the unemployment rate at 15-24 year-olds and age dummy variables indicate the persistence of initial labor market condition evaluated at the sample mean of EPL index. In a virtual country with the mean value of EPL index, a worker who experiences one percentage point higher unemployment rate at ages 15-24 suffers from 0.072 percentage points higher unemployment rate at ages 25-29, 0.012 percentage points at ages 30-34. In a country with the mean EPL index, the effect of labor market condition in 15-24 year-olds quickly fades away by age 30. The large estimated coefficients for the interaction terms with the EPL index imply a significant heterogeneity of the 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 increases the unemployment rate in 25-29 year-olds by 0.11 percentage points. On the contrary, in Portugal where the mean EPL

is 1.23, the effect is 1.01 percentage points.

The persistence of the initial labor market condition is stronger in countries with stricter employment protection. We argue the relationship is a causal by following mechanism. A firm in the country with stricter employment protection stops hiring a new worker instead of firing an existing worker when the firm is hit by a negative shock. The freeze of hiring lowers the probability of job finding upon a school graduation of a new school graduate. The initial lower probability for employment causes the lower probability of employment in the subsequent years if the port of entry to a job is concentrated at school graduation. A strict employment protection and a systematic arrangement of school-to-work transition are likely complementary institutions because a firm in a country with strict employment protection legislation attempts to collect information on the matching quality before hiring a specific worker. The expected match quality of a firm and a worker can be improved by information sharing between an employer and a school based upon historical experience.

Japan is typically known as a country with strict employment protection legislation and a systematic arrangement of school to work transition initiated by schools and public employment offices in case of high school graduates, while the US is known as a country for loose employment protection and non-systematic arrangement for school-to-work transition (Genda, Kondo and Ohta (2010)), whereas a typical high school graduate in the US frequently changes job to improve the job match quality (Topel and Ward (1992), Neal (1999), Neumark (2002) and Yamaguchi (2010)). Another example for the combination of strict employment protection and systematic transition from school to work is Germany where school-to-work transition is fostered by the apprenticeship system (United States General Accounting Office (1990)).

Evidence shows that a youth who enters the labor market in a bad time subsequently suffer from it in a country with strict employment protection legislation, combined with a systematic arrangement for school-to-work transition. The strict employment protection legislation requires better school-to-work transition system to coordinate a better match between an employee and an employer. The established school-to-work transition system necessarily concentrates the port of entry to a career job at school graduation.

The persistence of initial labor market condition on subsequent labor market outcome is stronger in countries with strict employment protection legislation than in countries with loose employment protection legislation. One might argue that the relationship is an artifact produced by a stronger impact of employment protection legislation on aged workers, while there is no theoretical reason why the stronger protection of aged workers produces a stronger persistence. To access the possibility, Column (3) in Table 4 reports the specification that includes the interaction terms of employment protection legislation (EPL) and age dummy variables. The estimated coefficients attenuate by about 5-10% compared with the coefficients reported in Column (2) but the result does not change qualitatively.

Unemployment rate at 15-24 year-olds of a specific cohort presumably captures the labor market condition at its school graduation, but participation to the labor market can be an endogenous decision because youth can stay in a school to avoid graduating in a bad time (Kondo (2007) and Kahn (2010)). The endogenous labor force participation by youth may well underestimate the actual labor market condition at school graduation. The labor force participation of other age groups could be endogenous as well. To access how much our estimates based on unemployment rate is affected by the endogenous

labor force participation, we estimate the identical models with employment-population rate. Columns (4) to (6) report the estimation results with the employment-population rate.

The result in Column(4) indicates that a cohort that experience one percentage point higher employment population rate at ages 15-24 experiences 0.12 percentage points higher employment population rate at 25-29 year-olds. The persistence, however, completely fades away by ages 30-34. The result based on employment population rate generally indicates milder dependence of employment outcomes on initial condition. The change of result is understandable because a part 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 effect of schooling on subsequent employment probability makes the result based on employment population rate less straightforward to interpret. However, the results based on employment population ratio preserves the result that the persistence of initial labor market condition is stronger in countries with stricter employment protection legislation as reported in Columns (5) and (6). A cohort that experiences high employment rate at labor market entry is more likely to work in subsequent years. The persistence of initial condition is stronger in countries with stricter employment protection legislation than in other countries.

Unemployment insurance and the persistence of initial labor market condition

Another labor market institution that encourages worker's mobility in the labor market is unemployment insurance system. Generous unemployment insurance assures the income flow during a job-to-job transition and enables an unemployed worker to find a job with good match quality reducing the fear of liquidity constraint

(Chetty (2008)). Indeed, generous unemployment insurance system fosters the sense of job security (Clark and Postel-Vinay (2009)) and encourages regional mobility of unemployed workers (Konstantinos (2009)). As an example, a generous unemployment payment combined with active labor market interventions is an integral part of Danish flexicurity policy (Andersen and Svarer (2007)). Worker's mobility induced by a generous unemployment insurance system may well expand the possibility of mid-career hiring and reduces the degree of persistence of initial labor market condition on subsequent labor market outcomes. To access this possibility, a model that includes the generosity of unemployment insurance payment, measured by the benefit replacement ratio, is estimated.

Table 5 Generous unemployment insurance makes unemployment more persistent, 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	0.118	0.120	0.107	0.103
(Reference: Age 25-29)	(0.010)	(0.010)	(0.010)	(0.015)	(0.016)	(0.015)
UE rate / Emp rate 15-24	-0.114	-0.104	-0.096	-0.121	-0.121	-0.107
×Age 30-34	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.013)
UE rate / Emp rate 15-24	-0.138	-0.126	-0.114	-0.167	-0.165	-0.150
×Age 35-39	(0.011)	(0.011)	(0.011)	(0.015)	(0.015)	(0.014)
UE rate / Emp rate 15-24	-0.171	-0.158	-0.145	-0.204	-0.203	-0.187
×Age 40-44	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)
Age 30-34	-2.071	-2.064	-2.047	5.233	5.282	5.234
	(0.074)	(0.074)	(0.072)	(0.150)	(0.151)	(0.144)
Age 35-39	-2.921	-2.918	-2.911	6.510	6.593	6.572
	(0.085)	(0.085)	(0.083)	(0.179)	(0.181)	(0.173)
Age 40-44	-3.242	-3.207	-3.221	6.464	6.559	6.576
	(0.099)	(0.099)	(0.096)	(0.211)	(0.214)	(0.206)
UE rate / Emp rate 15-24		0.007	0.009		0.003	0.002

×(BRR-$\overline{BRR}$)		(0.001)	(0.001)		(0.001)	(0.001)
UE rate / Emp rate 15-24		-0.005	-0.007		0.001	-0.002
×Age 30-34×(BRR-$\overline{BRR}$)		(0.001)	(0.001)		(0.001)	(0.001)
UE rate / Emp rate 15-24		-0.006	-0.009		0.001	-0.002
×Age 35-39×(BRR-$\overline{BRR}$)		(0.001)	(0.001)		(0.001)	(0.001)
UE rate / Emp rate 15-24		-0.008	-0.011		0.001	-0.002
×Age 40-44×(BRR-$\overline{BRR}$)		(0.001)	(0.002)		(0.002)	(0.002)
Constant	8.186	8.157	8.148	83.217	83.217	83.219
	(0.052)	(0.051)	(0.049)	(0.108)	(0.108)	(0.103)
Age dummies×EPL	No	No	Yes	No	No	Yes
Year × country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.72	0.74	0.75	0.74	0.74	0.77
N	1,471	1,471	1,471	1,471	1,471	1,471

Table 5 reports the estimation results. Column (1) replicates the same result as Table 4; the higher unemployment rate at ages 15-24, the higher the subsequent unemployment rate. Column (2) reports the specification that allows the persistence of initial labor market condition dependent on the generosity of unemployment insurance approximated by benefit replacement ratio (BRR). The positive coefficient for the interaction term of the unemployment rate at 15-24 year-olds, BRR and ages 25-29 implies that generous unemployment insurance makes the persistence stronger. To understand the size of interaction coefficient, we repeat the US-Portuguese comparison. In US, where the benefit replacement ratio is lower among the twenty countries with BRR=14, one percentage point higher unemployment rate at 15-24 year-olds is associated with -0.001 percentage points higher unemployment rate at 25-29. Without generous unemployment insurance, the persistence virtually does not exist. On the contrary, in Portugal where BRR=45, one percentage point higher unemployment rate at 15-24 year-olds is associated with 0.22 percentage points higher unemployment rate

at 25-29.

Contrary to our prior expectation that generous unemployment insurance system expands the port of entry to a career job and weakens the degree of persistence of the initial labor market condition on subsequent outcomes, it makes the persistence stronger. The positive relationship between generosity of unemployment insurance and the persistence is, however, understandable because a worker who is unemployed at the time of labor market entry continues to be unemployed with generous unemployment insurance payment. This estimation result is robust against the inclusion of the interaction terms of benefit replacement ratio (BRR) and age dummy variable (Column (3)) and the usage of employment-population rate (Columns (4) – (6)). Generous unemployment insurance makes the persistence of initial labor market condition on subsequent outcomes.

Conclusion

Constructing a cohort based panel data of 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 15-24 year-olds, on the unemployment rates at subsequent age groups. An analysis result indicates that one percentage point higher unemployment rate in 16-24 year-olds subsequently experience 0.14 percentage points higher unemployment in 25-29, 0.03 percentage points higher in 30-34. The persistence is stronger in a country with stricter employment protection legislation and generous unemployment insurance payment.

Build upon the rapidly expanding literature that shows the persistent of 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 institution: such as unemployment insurance or employment protection legislation. The persistence is stronger in countries with strict employment protection legislation and generous unemployment insurance. The result in this paper suggests that moderating macroeconomic fluctuation is more important in countries with stronger persistence of labor market entry condition on subsequent outcome.

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