



NEW ZEALAND

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THE UNEVEN IMPACT OF THE PANDEMIC ON NEW ZEALAND'S LABOR MARKET¹

While the pandemic's impact on New Zealand's labor market has been relatively mild by international comparison, it has disproportionately affected the youth, female workers, and some ethnic groups. The pandemic could thus lead to scarring and aggravate already relatively high inequality. Strong labor market policy support, including training and hiring subsidies, is warranted to facilitate the reallocation of workers affected by the pandemic.

A. Introduction

1. The pandemic has had an uneven impact on New Zealand's labor market, calling for renewed policy efforts. Despite the severe initial lockdown, a proactive policy response, especially the large-scale job retention policy, helped cushion the impact of the pandemic on labor market outcomes. However, the COVID-19 shock has had an uneven impact on different groups of workers, with more severe effects on youth, female and low-skilled workers, along with some ethnic groups. Experience from past recessions suggests that poor labor market outcomes, especially for the youth, can have persistent effects leading to scarring. Furthermore, the larger impact on already disadvantaged groups is likely to aggravate inequality. Therefore, strong policy support is warranted.

2. This paper analyzes the impact of the pandemic on New Zealand's labor market and discusses policy options. Section B discusses the pre-COVID landscape of New Zealand's labor market and inequality. Section C analyzes the labor market developments since the onset of the pandemic, delving into labor market indicators of different worker groups. Section D considers the possible scarring effects of the pandemic by drawing on cross-country labor market data. Section E analyzes the effectiveness of labor market policies to address emerging labor market issues, utilizing a cross-country dataset of labor market policies. Section F discusses policy options for New Zealand. Section G concludes by distilling policy implications from the paper's findings.

B. Labor Market and Inequality Before the Pandemic

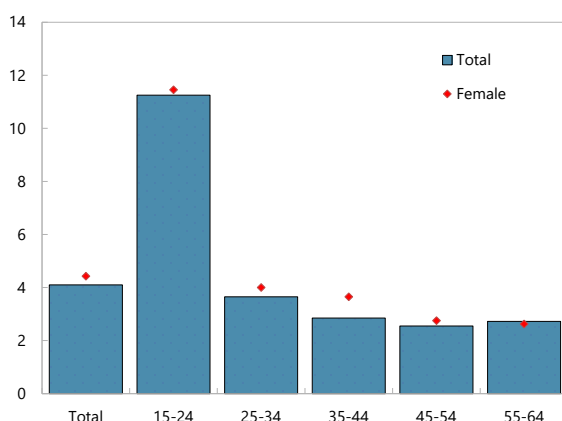
3. Despite relatively low unemployment before the pandemic, there was significant dispersion, with higher unemployment in some groups. Following a persistent increase after the global financial crisis, the unemployment rate decreased gradually to 4.1 percent in 2019. However, the youth unemployment rate was relatively high even before the pandemic, standing at 11.3 percent in 2019, similar to the OECD average, but higher than the average of major advanced economies (G7 average: 9.4 percent). Female unemployment was higher than male unemployment in most age groups, with a relatively large gap in the age group of 35-44.

¹ Prepared by Yosuke Kido and Siddharth Kothari (both APD). The chapter benefited from valuable comments by the Treasury of New Zealand, the Ministry of Business, Innovation and Employment (MBIE), the Ministry of Social Development (MSD), and participants at a virtual seminar.

4. Some ethnic groups faced higher unemployment. Historically, there has been large dispersion of labor market conditions between ethnic groups, with high unemployment rates among Māori and Pacific people, while their labor force participation rates have been lower. Such dispersion is observed in all age groups, suggesting that factors other than mere age distribution play a role. In part due to the dispersion in labor market outcomes across groups, inequality in New Zealand was relatively high compared to other advanced economies.

Youth and Female Unemployment Rates Are Higher

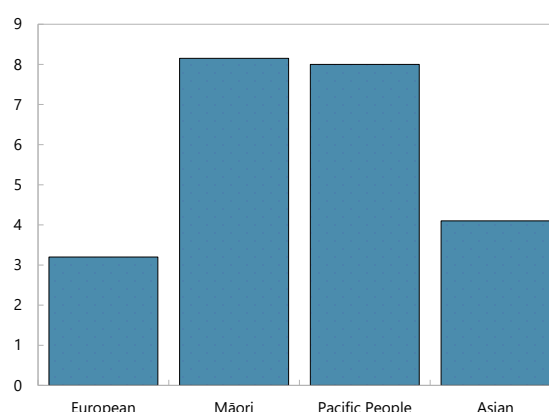
(Unemployment rate by age and gender, 2019, percent)



Sources: Stats NZ and IMF staff calculations.

Large Dispersion Among Ethnic Groups

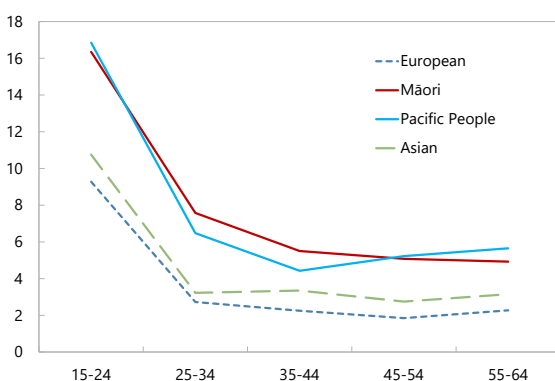
(Unemployment rate by ethnicity, 2019, percent)



Sources: Stats NZ and IMF staff calculations.

Gaps Among Ethnic Groups Are Observed in All Age Groups

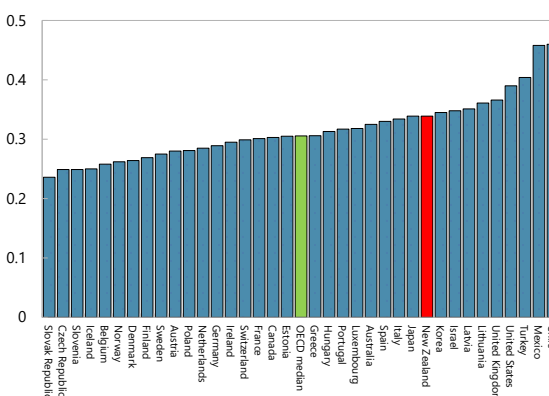
(Unemployment rate by age and ethnicity, 2019, percent)



Sources: Stats NZ and IMF staff calculations.

Inequality in New Zealand Was Relatively High Before the Pandemic

(Gini coefficient, latest, 2017-19)

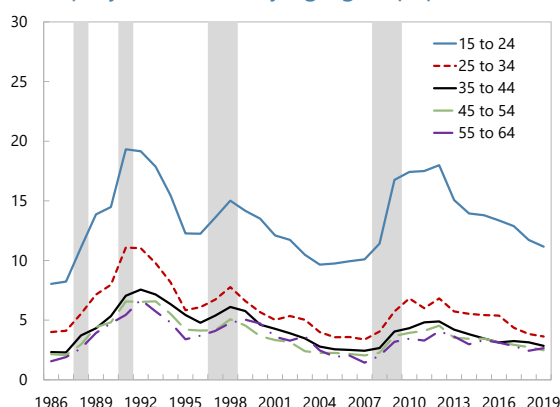


Sources: OECD and IMF staff calculations.

5. In previous recessions, young workers and low-skilled workers were affected more strongly. Output fluctuations affect unemployment differently across worker groups. Estimates of Okun's law, the relationship between changes in unemployment and output growth, suggest that the unemployment rate among youth in New Zealand is more sensitive to economic cycles than that

among other age groups, with the sensitivity nearly twice as large as the average of all age groups. Similarly, low-skilled workers are also more prone to lose their jobs during economic downturns. Employment of female workers, on average, tended to be less sensitive to macroeconomic conditions in previous business cycles, as they have higher representation in typically less procyclical service sectors.²

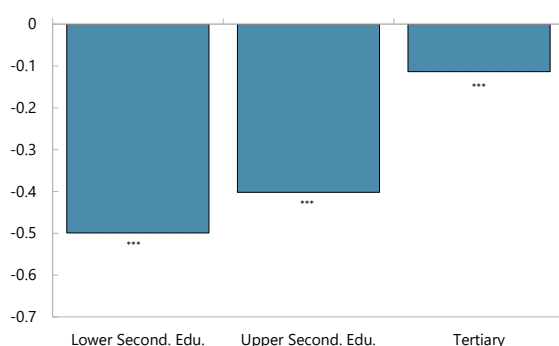
Youth Unemployment Tends to Increase More Sharply During Downturns (Unemployment rates by age group, percent)



Sources: Stats NZ and IMF staff calculations.

Note: Shaded area indicates New Zealand recessions defined by Hall (2014).

Low-Skilled Workers Tend to be Affected by Economic Fluctuations (Okun's law coefficient)

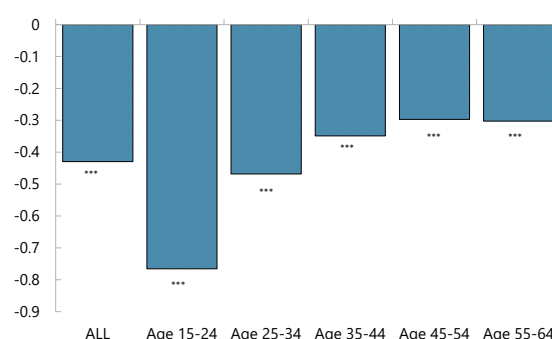


Source: IMF staff calculations

Note: Bars show the sensitivity of the unemployment rate to GDP growth. See Annex I for methodology.

*** denotes significance at the 1 percent level.

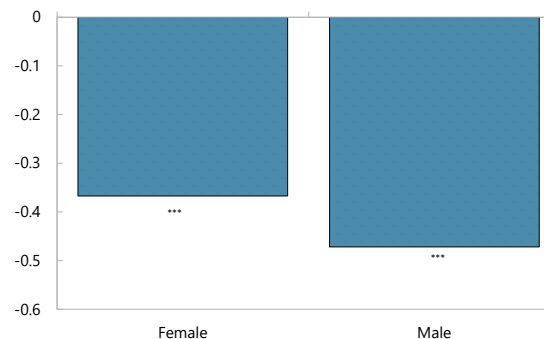
Young Workers Are More Sensitive to Economic Cycles (Okun's law coefficient)



Source: IMF staff calculations.

Note: Bars show the sensitivity of the unemployment rate to GDP growth. See Appendix I for methodology. *** denotes significance at the 1 percent level.

Female Employment Tended to be Less Procyclical in Previous Business Cycles (Okun's law coefficient)



Source: IMF staff calculations.

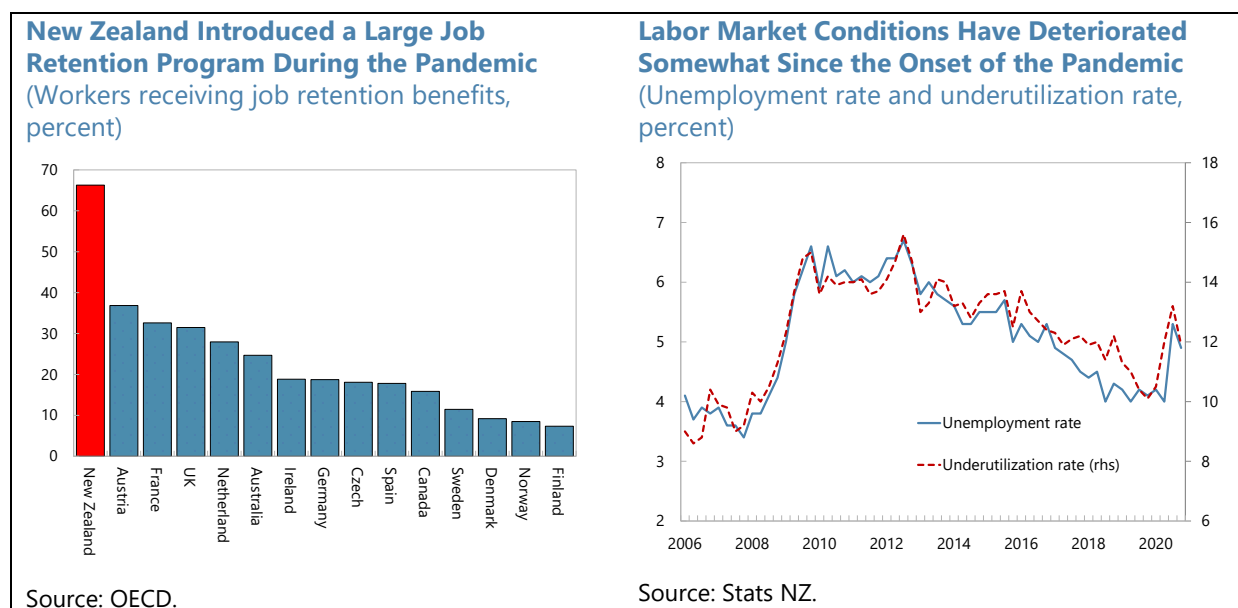
Note: Bars show the sensitivity of the unemployment rate to GDP growth. See Annex I for methodology.

*** denotes significance at the 1 percent level.

² Similar difference by gender is also observed in other countries (Zanin 2014).

C. Impact of the Pandemic on New Zealand's Labor Market

6. The pandemic's labor market impact has been relatively contained. New Zealand introduced a strict lockdown and border closure in March 2020. Hours worked declined by close to 9 percent in 2020Q2 before recovering in Q3. To alleviate the impact of the pandemic and the containment measures, the government introduced a wage subsidy scheme covering more than 60 percent of workers, the widest coverage among such schemes in the world.³ As a result, the impact on labor market aggregates has been relatively small so far. The aggregate unemployment rate increased modestly to 4.9 percent in 2020Q4 from 4.1 percent in 2019Q4, while the underutilization rate increased more sharply from 10.1 percent in 2019Q4 to 11.9 percent in 2020Q4.



7. Job losses have been concentrated in contact-dependent service sectors. Labor market adjustment has been uneven across sectors, and job losses have been concentrated in some service sectors dependent on tourism, such as accommodation, food services, and recreational services. The adjustment is different from previous recessions, where manufacturing and constructions were affected more severely.

8. The impact of the pandemic has been uneven, with a more severe impact on youth, female, and low-skilled workers.⁴ Youth employment has seen the largest adjustment, with a 2.4 percentage point y/y increase in the unemployment rate. Furthermore, as job losses have been concentrated in contact-intensive service sectors, this has resulted in a larger increase in female unemployment and underutilization. By ethnicity, as pointed out in the Budget Policy Statement

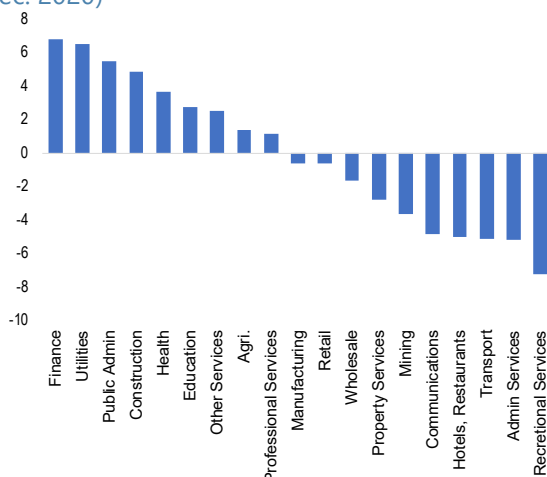
³ See OECD (2020) for detail of other countries' schemes and IMF Policy Tracker (<https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19>) for fiscal costs of these responses. Wage subsidies in New Zealand expired in October 2020, and subsidies are expected to be re-instated contingent on COVID-19 resurgence.

⁴ Similar uneven effects of the pandemic are observed in many other economies. See IMF (2020) and references therein for detail.

2021, Māori and Pacific people have been more affected than other ethnic groups.⁵ Workers with lower levels of education also appear to be more severely impacted compared with those with higher levels of education.

Job Losses are Concentrated in Some Service Sectors

(Employment by industry, y/y percent change, in Dec. 2020)

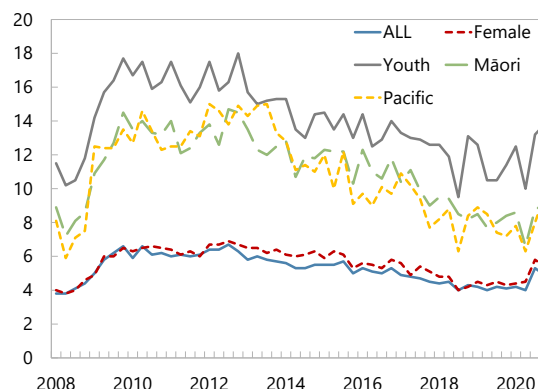


Sources: Stats NZ and IMF staff calculations.

Note: Employment growth rates calculated from tax data released by Stats NZ.

Labor Market Adjustment Has Been Uneven Among Worker Groups

(Unemployment rate, percent)

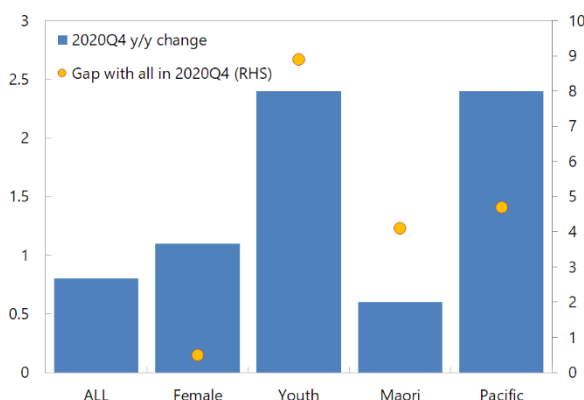


Source: Stats NZ.

Note: Unemployment rates for all workers and female workers are seasonally adjusted.

Some Worker Groups Have Been Affected More Severely

(Unemployment rate, percentage points)



Sources: Stats NZ and IMF staff calculations.

The Gender Gap Has Widened

(Female minus male, ppts)



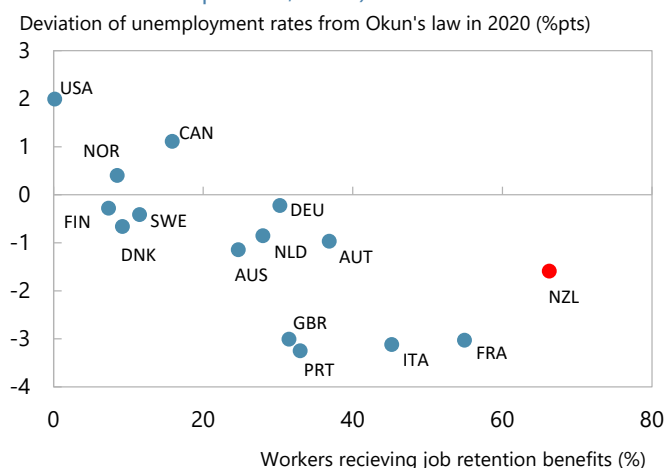
Sources: Stats NZ and IMF staff calculations.

⁵ Based on the analysis by New Zealand Treasury, Budget Policy Statement 2021 pointed out that Māori and Pacific workers were more likely to have dropped into a low-income bracket (of between NZ\$200 and NZ\$300 per week) from March to August 2020. Māori indicators in Household Labour Force Survey have been volatile. The employment rate declined sharply in 2020Q3 but recovered in 2020Q4. A gap with overall workers remains high. The unemployment rate of Asian workers has increased more sharply than the aggregate after the pandemic, although it remains well below unemployment rates of Māori and Pacific people.

9. The wage subsidy program has played an important role in cushioning the labor market impact of the crisis. International comparison suggests that countries with larger coverage of job retention programs tended to have more benign labor market outcomes compared to predictions based on Okun's law, the historical relationship between output and the unemployment rate (see Annex I for details).⁶ In New Zealand, especially the youth unemployment rate increased by less than predicted based on historical Okun's law estimates, suggesting that wage subsidies (and the broader policy response) were particularly effective in cushioning the impact on young workers. Furthermore, while helpful for female workers, male workers tended to benefit more. These observations are consistent with the Ministry of Social Development (MSD) administrative data, which shows that the proportion of young workers and male workers that received wage subsidies was higher than that of other groups.

Job Retention Programs Tended to Cushion the Labor Market Impact

(International comparison, 2020)

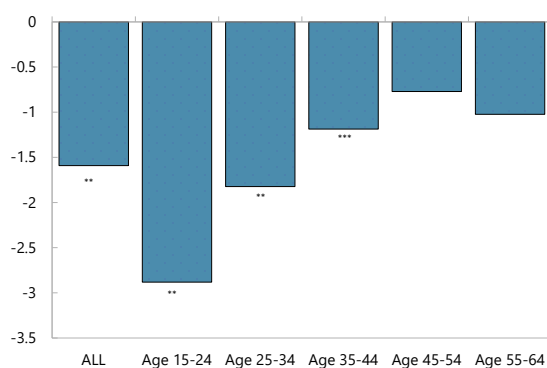


Sources: OECD and IMF staff estimates

Note: See Annex I for methodology.

Wage Subsidies Helped Young Workers More

(Deviation of unemployment rates from Okun's law in New Zealand in 2020, percentage points)

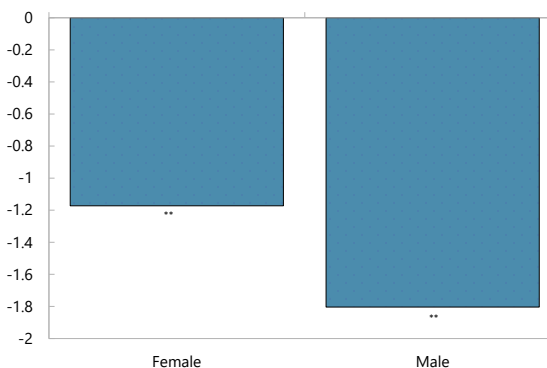


Source: IMF staff calculations

Notes: ** and *** denote significance at the 5 and 1 percent levels, respectively. See Annex I for methodology.

Male Workers Benefited More From Wage Subsidies

(Deviation of unemployment rates from Okun's law in New Zealand in 2020, percentage points)



Source: IMF staff calculations

Notes: ** and *** denote significance at the 5 and 1 percent levels, respectively. See Annex I for methodology.

⁶ For the international comparison, in addition to the coverage of job retention schemes, the duration of the schemes may affect the impact of the job retention policies as well.

D. Scarring Effects

10. Although the economy has embarked on a quick recovery, concerns about the potential for labor-market scarring remain. Labor market conditions at the time when people graduate from school can have significant effects on medium-term outcomes (see Cockx, 2016, for an overview). As youth unemployment has seen a significant spike following the COVID-19 shock, this raises the possibility that unemployment rates may remain high for an extended period for the cohort that is entering the labor market at this time.

11. In this section, cross-country data is used to conduct cohort analysis to assess the possible magnitude of scarring in the labor market. The empirical framework is that of Kawaguchi and Murao (2014), which assesses the extent to which higher unemployment rates faced by a cohort in their youth translates into higher unemployment rates for the same cohort in later years. The regression equation takes the form:

$$u_{cit} = \alpha + \beta * u_{youth,ci} * ageGrp_{ct} + \gamma * ageGrp_{ct} + \delta_{it} + \epsilon_{cit}$$

Where u_{cit} is the unemployment rate of cohort 'c' in country 'i' at time 't', $u_{youth,ci}$ is the unemployment rate faced by the cohort in their youth (15 to 24 years of age), and $ageGrp_{ct}$ is a vector of dummies which takes value 1 for ages corresponding to the groups 25–29, 30–34, 35–39, and 40–44. The vector of coefficients β indicates the extent to which higher youth unemployment for a cohort translates into higher unemployment at different ages in the future. δ_{it} controls for country-year shocks which impact all cohort/age groups equally (e.g. a recession which pushes up unemployment rate for all cohorts in a country) and standard errors are clustered at the country level. Unemployment rates by age group (five-year intervals) from the OECD for 30 countries from the period 1960 to 2019 are used to construct the dataset at the country-cohort-year level.

12. The results confirm that high youth unemployment can have persistent effects. A cohort which experiences a 1 percentage point higher unemployment rate during its youth also suffers from about a 0.2 percentage point higher unemployment rate when they are 25 to 29 years of age, and about 0.05 percentage point higher (+0.208–0.150) unemployment rate when they are 30 to 34 years of age. Beyond age 35, the effect of youth unemployment becomes insignificant.

13. The extent of scarring is larger for women and for countries with less flexible labor markets. Columns 2 and 3 of Table 1 repeat the regression for males and females separately. High youth unemployment translates to unemployment rates at 25 to 29 years of age being 0.21 percentage point higher for women, slightly more than the estimated 0.19 percentage point for men. Importantly, while women continue to have higher unemployment at age 30 to 34, the effect becomes insignificant for men at this age. Finally, column 4 adds an interaction term with a country-level measure of employment protection restrictions to the regression, which Kawaguchi and Murao (2014) used as a proxy for flexibility of labor markets. As expected, persistent effects of youth unemployment are larger for countries with more restrictive employment protections. This indicates that countries with more flexible labor markets are likely to experience less scarring from high youth

unemployment.⁷ Conditional on the level of New Zealand's (relatively mild) employment protections, the average increase of New Zealand's youth unemployment rate in previous recessions (8-9 percentage points) translates to about a 0.4-0.5 percentage point higher unemployment rate at ages 25 to 29, compared to an impact of about 2.5 percentage points in a country with the average level of employment protections.

Table 1. New Zealand: Cross-Country Evidence: Impact of Youth Unemployment on Future Unemployment Rates

VARIABLES	(1) All	(2) Male	(3) Female	(4) EPL Interaction
Youth unemployment	0.208*** (0.0414)	0.185*** (0.0463)	0.212*** (0.0319)	0.132*** (0.0381)
Reference age group: 25 to 29				
Youth unemployment*Age dummy for 30 to 34	-0.150*** (0.0295)	-0.143*** (0.0299)	-0.142*** (0.0255)	-0.106*** (0.0174)
Youth unemployment*Age dummy for 35 to 39	-0.212*** (0.0455)	-0.197*** (0.0467)	-0.199*** (0.0401)	-0.139*** (0.0245)
Youth unemployment*Age dummy for 40 to 44	-0.246*** (0.0550)	-0.227*** (0.0547)	-0.229*** (0.0509)	-0.160*** (0.0273)
Youth unemployment*EPL				0.156** (0.0597)
Reference age group: 25 to 29				
Youth unemployment*EPL*Age dummy for 30 to 34				-0.120** (0.0465)
Youth unemployment*EPL*Age dummy for 35 to 39				-0.208*** (0.0632)
Youth unemployment*EPL*Age dummy for 40 to 44				-0.257*** (0.0693)
Constant	6.139*** (0.587)	6.181*** (0.633)	6.501*** (0.476)	7.152*** (0.587)
Observations	14,379	14,379	14,379	14,379
R-squared	0.961	0.945	0.967	0.968

Notes: Data on unemployment rate at the country-cohort-age level from OECD. EPL stands for Employment Protection Legislation Index also sourced from OECD. Sample consists of 30 countries from 1960 to 2019.

E. Active Labor Market Policies

14. The literature generally points to the effectiveness of active labor market policies in fostering employability. At the aggregate level, with OECD cross-country samples, Bassanini and Duval (2006) find that some types of active labor market policies, such as training, are associated with lower unemployment. With samples from selected advanced economies, Estevao (2003, 2007) finds positive effects of active labor market policies on the employment rate of the business sector. Micro-level evidence often finds heterogenous effects among different groups of workers, suggesting that the design, targeting, and implementation of a policy are paramount in ensuring its

⁷ Results are qualitatively similar if we look at the impact on employment rates instead of unemployment rates. In particular, lower youth employment rates are associated with lower employment rates at older ages, with the effect being somewhat larger for women (see Annex II, Table 1).

effectiveness. With a meta-analysis of over 200 micro-level studies of active labor market policies in advanced and emerging economies, Card and others (2018) find that active labor market policies, such as training and private sector employment subsidy programs, have been generally effective, especially in the medium- to long-term, and their effects tend to increase in recessions. Direct job creation is often found to be less effective compared to training and hiring subsidies (Kleuv 2010).

15. In this section, a cross-country dataset of active labor market policies is used to analyze the effectiveness of active labor market policies. The effectiveness of active labor market policies in improving labor market conditions can be quantified by examining the experience of different advanced economies that have had a variety of labor market policies over multiple years. This section uses cross-country panel data of OECD countries, which includes labor market indicators and key policy variables. The empirical framework is based on the standard Okun's law model, augmented with active labor market policies. The regression equation takes the form

$$\Delta u_{i,t} = \alpha_t + \alpha_i + \sum_{j=1}^n \beta_j \Delta ALMP_{i,j,t-1} + \gamma_1 * \Delta \ln(GDP_{i,t}) + \gamma_2 * \Delta \ln(GDP_{i,t-1}) + \epsilon_{i,t}$$

where $\Delta u_{i,t}$ denotes a change in the unemployment rate of country i at time t , and $\Delta ALMP_{i,j,t}$ denotes a change in the spending in percent of GDP on active labor market policy j . In this exercise, we include three types of active labor market policies: training; employment incentives (e.g. recruitment incentives and employment maintenance incentives); and other policies, which include direct job creation, start-up incentives, and rehabilitation.⁸ In the regression, the average of previous two years is used as active labor market policies typically impact outcomes with lags (e.g. Card and others 2018). $\Delta \ln(GDP_{i,t})$ denotes GDP growth rate. The panel dataset covers OECD economies from 1994 to 2019. We run this regression for the overall, female, and youth unemployment rates.

Table 2. New Zealand: Effects of Active Labor Market Policies

	ALL	Female	Young
Training (lagged)	-0.68 (0.86)	-0.65 (1)	-3.61* (2.07)
Employment Incentives (lagged)	-2.59** (0.99)	-3.02* (1.71)	-5.03** (2.1)
Other ALMP (lagged)	0.47 (1.16)	-0.21 (1.32)	-0.16 (2.46)
GDP growth	-0.22*** (0.04)	-0.19*** (0.04)	-0.42*** (0.11)
GDP growth (lagged)	-0.11*** (0.02)	-0.11*** (0.02)	-0.22*** (0.03)
Country FE	Y	Y	Y
Time FE	Y	Y	Y
Observations	545	545	545
Sample Period	1994-2019	1994-2019	1994-2019

Source: IMF staff estimates.

Notes: The dependant variable is a change in unemployment rate. Clustered robust standard errors are estimated.

⁸ Spending on public employment services (e.g. cost of running unemployment insurance offices) is excluded from this exercise to alleviate endogeneity concerns.

16. The cross-country estimation results generally support the effectiveness of active labor market policies. Estimation results show that employment incentives are particularly effective for the overall population.⁹ Subgroup analysis suggests that training programs are particularly effective for young people, which tend to have weaker occupational skills, suggesting that appropriate targeting is essential to improve the effectiveness of labor market policies. Employment incentives tend to be more effective for female workers. Other active labor market policies, such as direct job creation, are not found to be effective for all types of workers.¹⁰

17. The design and targeting of schemes matter to maximize the effectiveness of active labor market policies. Micro-level evidence often suggests that training is particularly effective for low-skilled workers and for reducing long-term unemployment (e.g. Card and others, 2018). Some literature argues that specific skill training tends to have larger effects compared to general training (e.g. Greenberg and others, 2003 and Jacobson et al, 2005) and that training can be particularly effective when combined with job search assistance (Dorsett 2006). Hiring subsidies would have a larger impact on employment if targeted at small firms, low-wage workers, and jobs with rigid wages, and would be more cost-effective if they are used temporarily during recessions (Cahuc, 2019).

F. Policy Options to Address Emerging Labor Market Issues and Inequalities in New Zealand

18. New Zealand can further increase its spending to address emerging labor market issues and growing inequalities. Spending on active labor market policies in New Zealand has been relatively low and was on a declining trend before the pandemic.¹¹ Public spending on active labor market policies has been reduced to 0.2 percent of GDP in 2017 from 0.5 percent in 2004, with a marked decline in spending on training (Welfare Expert Advisory Group, 2018). Like in some other advanced economies, active labor market policies were not deployed actively during the global financial crisis. Since the onset of the pandemic, New Zealand has expanded active labor market policies, including direct job creation, hiring subsidies, and free access to training (see Table 3), in addition to the large-scale wage subsidy scheme that was central in supporting workers affected by the pandemic. Going forward, more can be done in some areas to foster employability and promote human capital accumulation.

⁹ Using a meta analysis of European labor markets, Kluve (2010) finds that private sector incentive schemes, such as hiring subsidies, tend to have a larger impact on employment compared to training.

¹⁰ Results are robust to adding a lagged change in the spending on passive labor market policies.

¹¹ It should be noted that gap with other countries will be smaller after the size of unemployment is controlled for. The data (*Public expenditure and participation stock on LMP*, obtained from OECD.stat) do not include broader support measures, such as education spending and childcare.

Table 3. New Zealand: Labor Market Policies and Income Support Measures Introduced After the Pandemic

- Wage subsidies (NZ\$ 14.8 bn)
- Permanent increase in social benefits (NZ\$ 2.4 bn)
- COVID-19 leave and self-isolation support (NZ\$ 0.1 bn)
- Income Relief Payment (NZ\$ 0.6 bn)
- Increase in Winter Energy Payment (NZ\$ 0.5 bn)
- Job creation in environmental projects (NZ\$ 1.1 bn)
- Targeted Training and Apprenticeship Fund (NZ\$ 0.3 bn)
- MSD capacity expansion (NZ\$ 0.4 bn)
- Expansion of Flexi-Wage Subsidies (NZ\$ 0.3 bn)
- He Poutama Rangatahi – youth employment support (NZ\$ 0.1 bn)

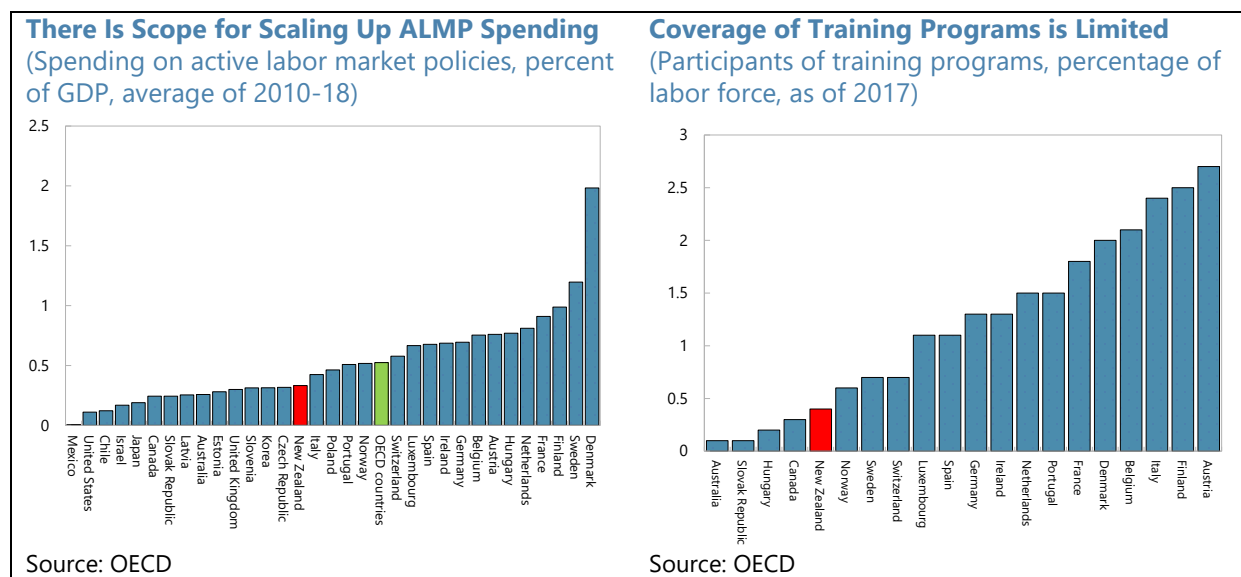
Source: New Zealand authorities.

19. New Zealand can step up support for displaced workers and alleviate skill mismatches in the labor market. In New Zealand, training schemes cover only a limited part of the labor force.¹²

The coverage of training programs can be expanded to support broader workers in transition, in particular low-skilled workers and long-term unemployed individuals. Training programs should also be upgraded to reflect needs from industry, and the ongoing Reform of Vocational Education (RoVE) is a step in the right direction and should enhance effectiveness of training programs. The recent expansion of Flexi-Wage subsidies (hiring subsidies) is a welcome development, and support targeted at displaced low-wage workers can be scaled up if long-term unemployment persists. Strong job search assistance would also facilitate reallocation of workers at relatively low fiscal costs. In addition to scaling up policies, it will also be important to review and reinforce the quality of interventions. While training and hiring subsidies are assessed to be effective, other programs may have some room for improvement (MSD 2019). More generally, as the employment likelihood decreases with duration of the unemployment spell, early activation is crucial to limit scarring in the labor market and promote long-term human capital accumulation.

20. Policies should also address inequality and the gender gap. There are large disparities in education achievement in New Zealand, with Māori and Pacific People's education achievement remaining below the rest of the population. Targeted education support for these groups would promote human capital accumulation and reduce inequality in the longer run. Expanding childcare support would promote labor force participation of female workers and would help close the gender gap, which has deteriorated after the pandemic.

¹² Training programs in New Zealand are narrowly targeted to those who are receiving benefits (e.g. Jobseeker Support).



G. Conclusion

21. The pandemic has had a relatively mild yet uneven impact on New Zealand's labor market, aggravating pre-existing disparities in labor market outcomes. Even before the COVID-19 shock, unemployment was significantly higher among the youth, women, low-skilled workers, and particular ethnic groups (Māori and Pacific peoples). The large-scale wage subsidy program has mitigated the impact of the crisis on labor market outcomes. However, the groups with worse outcomes before the crisis have generally also suffered relatively more during the pandemic, especially youth who have seen the largest drop in employment.

22. The relatively large impact of the crisis on youth and women raises concerns about the potential for labor market scarring. Our cross-country estimates based on cohort analysis suggest that a 1 percentage point increase in youth (between 15 and 24 years of age) unemployment is associated with a 0.2 percentage point higher unemployment rate between the ages of 25 and 29. Furthermore, the scarring effects are larger and more persistent for women.

23. Continued macroeconomic policy support and active labor market policies can help mitigate the distributional effects of the crisis and reduce scarring. Active labor market policies, such as training, especially for young workers, and hiring subsidies would facilitate reallocation of workers affected by the pandemic, thereby limiting the scarring. Spending on active labor market policies in New Zealand has been relatively low, suggesting that there is scope for scaling up policy support. New Zealand can upgrade training programs and expand their coverage to broader workers, including low-skilled people. Hiring subsidies targeted to low-wage workers would foster employability in New Zealand. Strong policy actions would also promote long-term human capital accumulation and reduce growing inequality.

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Annex I. Okun's Law Equations

Okun's law regressions are estimated to analyze the sensitivity of the unemployment rates of different worker groups to macroeconomic conditions. Specifically, the following regression is estimated:

$$\Delta u_t = \alpha + \beta_1 * \Delta \ln(GDP_t) + \beta_2 * \Delta \ln(GDP_{t-1}) + \gamma * Dummy_{2020} + \epsilon_t,$$

where Δu_t denotes a change in the unemployment rate at time t of different groups, $\Delta \ln(GDP_t)$ denotes GDP growth rate, and $Dummy_{2020}$ denotes a dummy variable that takes 1 in 2020, which is included to control for policy effects, including wage subsidies.¹ Parameters are estimated at the annual frequency. For comparison, regression without the dummy variable is also estimated. Tables I.1 and I.2 report estimated parameters for different worker groups in New Zealand and Table I.3 shows the international comparison.

The charts in Section B report estimated sensitivities of the unemployment rate to GDP growth ($\beta_1 + \beta_2$) from these tables. Section C reports the estimated coefficients of the dummy variable (γ) for different worker groups, as well as the international comparison. This coefficient reflects the extent to which unemployment in 2020 deviated from the historical relation between output and unemployment, capturing the impact of the policy response, especially job retention schemes, in cushioning the labor market impact of the pandemic. Figure I.1 shows actual and predicted values of the unemployment rate for selected worker groups.

Table I.1. New Zealand: Okun's Law Equations by Age Groups

	ALL	Age 15-24	Age 25-34	Age 35-44	Age 45-44	Age 54-64	ALL	Age 15-24	Age 25-34	Age 35-44	Age 45-44	Age 54-64
GDP growth	-0.377*** (0.058)	-0.7*** (0.134)	-0.419*** (0.083)	-0.279*** (0.036)	-0.227*** (0.048)	-0.215*** (0.063)	-0.288*** (0.053)	-0.538*** (0.118)	-0.317*** (0.073)	-0.212*** (0.035)	-0.184*** (0.04)	-0.157*** (0.053)
GDP growth (lagged)	-0.052 (0.057)	-0.066 (0.13)	-0.049 (0.08)	-0.07* (0.035)	-0.07 (0.046)	-0.088 (0.061)	-0.098 (0.06)	-0.15 (0.132)	-0.102 (0.082)	-0.104** (0.039)	-0.092* (0.045)	-0.118* (0.06)
Dummy_2020	-1.591** (0.583)	-2.882** (1.341)	-1.823** (0.828)	-1.187*** (0.361)	-0.772 (0.476)	-1.024 (0.628)	- -	- -	- -	- -	- -	- -
Constant	1.072*** (0.17)	2.017*** (0.39)	1.17*** (0.241)	0.909*** (0.105)	0.75*** (0.139)	0.784*** (0.183)	0.915*** (0.177)	1.734*** (0.39)	0.99*** (0.242)	0.792*** (0.115)	0.674*** (0.134)	0.683*** (0.177)
Adj R-squared	0.70	0.59	0.58	0.80	0.62	0.46	0.64	0.54	0.52	0.73	0.59	0.43
Sample Period	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020

Source: IMF staff estimates.

Table I.2. New Zealand: Okun's Law Equations by Gender and Education Groups

	Female	Male	Female	Male	Lower Second.	Upper Second.	Tertiary
GDP growth	-0.319*** (0.056)	-0.417*** (0.067)	-0.254*** (0.049)	-0.315*** (0.061)	-0.5*** (0.079)	-0.344*** (0.073)	-0.138*** (0.049)
GDP growth (lagged)	-0.048 (0.055)	-0.055 (0.065)	-0.082 (0.055)	-0.108 (0.069)	0.0004 (0.076)	-0.058 (0.07)	0.024 (0.047)
Dummy_2020	-1.172** (0.565)	-1.804** (0.674)	- -	- -	- -	- -	- -
Constant	0.918*** (0.164)	1.172*** (0.196)	0.802*** (0.164)	0.994*** (0.204)	1.301*** (0.24)	1.07*** (0.221)	0.249 (0.148)
Adj R-squared	0.65	0.68	0.61	0.61	0.66	0.57	0.21
Sample Period	1990-2020	1990-2020	1990-2020	1990-2020	1991-2019	1991-2019	1991-2019

Source: IMF staff estimates.

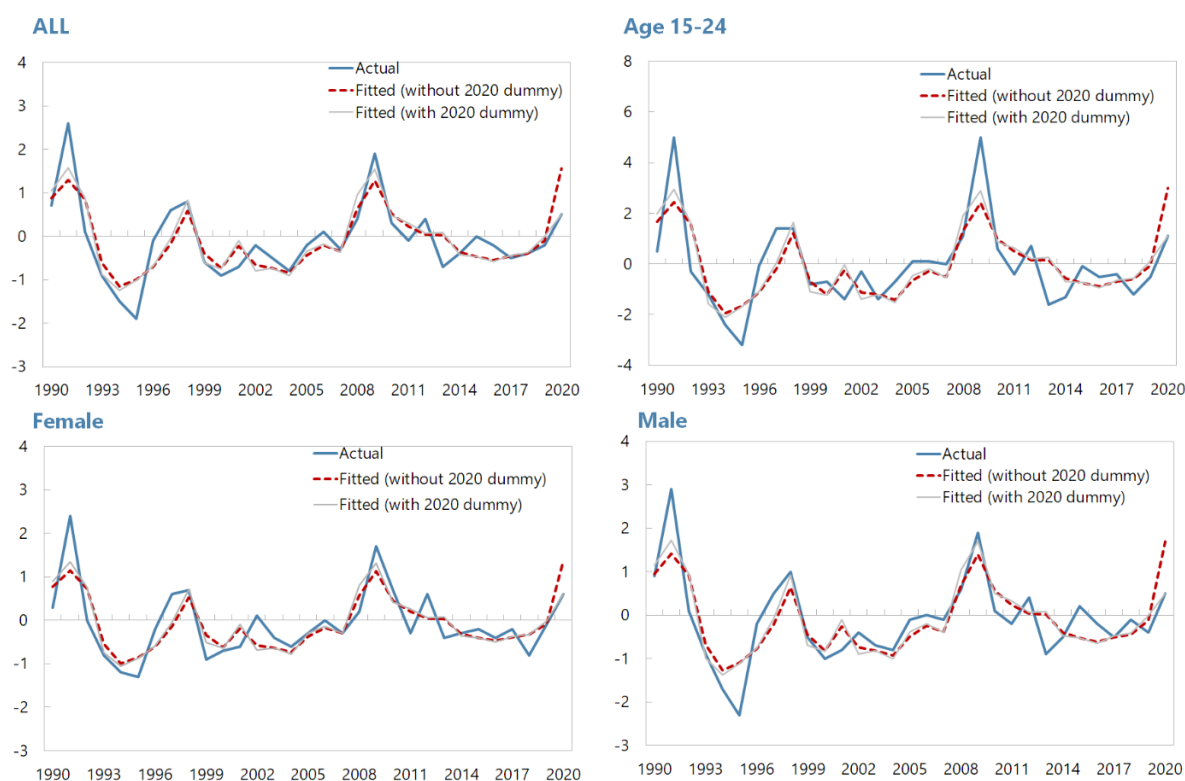
¹ Of course, to the extent that the policy response also mitigated the decline in GDP, the overall effect of policies on the unemployment rate is likely larger. It should also be noted that the dummy variable may capture other factors, including structural changes and possible measurement errors during the lockdown.

Table I.3. New Zealand: Okun's Law Equations for Selected Advanced Economies

	NZL	AUT	AUS	CAN	DEU	DNK	FIN	FRA	GBR	ITA	NLD	NOR	PRT	SWE	USA
GDP growth	-0.377*** (0.058)	-0.203*** (0.051)	-0.425*** (0.075)	-0.36*** (0.039)	-0.196*** (0.067)	-0.335*** (0.048)	-0.257*** (0.056)	-0.252*** (0.059)	-0.306*** (0.055)	-0.223*** (0.063)	-0.216*** (0.066)	-0.13* (0.069)	-0.413*** (0.115)	-0.318*** (0.05)	-0.41*** (0.084)
GDP growth (lagged)	-0.052 (0.057)	-0.006 (0.051)	-0.212*** (0.073)	-0.058 (0.039)	-0.055 (0.061)	-0.122** (0.049)	-0.221*** (0.055)	-0.119** (0.055)	-0.097* (0.055)	-0.137** (0.061)	-0.166** (0.065)	-0.055 (0.069)	-0.013 (0.114)	-0.208*** (0.05)	-0.089 (0.083)
Dummy_2020	-1.591** (0.583)	-0.965 (0.589)	-1.143* (0.607)	1.115** (0.457)	-0.223 (0.814)	-0.661 (0.519)	-0.278 (0.97)	-3.028*** (0.726)	-3.006*** (0.805)	-3.117*** (0.855)	-0.85 (0.679)	0.402 (0.503)	-3.248** (1.525)	-0.413 (0.658)	1.995** (0.807)
Constant	1.072*** (0.17)	0.371** (0.14)	1.86*** (0.27)	0.857*** (0.115)	0.261 (0.181)	0.676*** (0.135)	0.927*** (0.196)	0.597*** (0.132)	0.673*** (0.14)	0.282** (0.119)	0.703*** (0.173)	0.376** (0.166)	0.5* (0.249)	1.282*** (0.172)	1.166*** (0.252)
Adj R-squared	0.70	0.44	0.68	0.89	0.25	0.72	0.67	0.54	0.64	0.45	0.51	0.25	0.44	0.71	0.73
Sample Period	1990-2020	1997-2020	1988-2020	1990-2020	1992-2020	1993-2020	1989-2020	1990-2020	1990-2020	1990-2020	1990-2020	1990-2020	1997-2020	1990-2020	1990-2020

Source: IMF staff estimates.

Figure I.1. Actual and Fitted Unemployment Rates (Changes in Unemployment Rates, pts)



Note: Fitted values are based on Okun's law equations reported in Appendix Table 1 and 2 (with and without 2020 dummies).
Sources: IMF staff estimates.

Annex II. Additional Results on Impact of Youth Unemployment on Future Unemployment Rates

Table II.1. New Zealand: Impact of Youth Employment on Future Employment Rates				
VARIABLES	(1) All	(2) Male	(3) Female	(4) EPL Interaction
Youth employment rate	0.170** (0.0705)	0.169*** (0.0513)	0.195* (0.111)	0.0927 (0.0820)
Reference age group: 25 to 29				
Youth employment*Age dummy for 30 to 34	-0.0920** (0.0398)	-0.142*** (0.0491)	-0.0614 (0.0444)	-0.0556 (0.0350)
Youth employment*Age dummy for 35 to 39	-0.133** (0.0519)	-0.191*** (0.0664)	-0.0872 (0.0565)	-0.0868* (0.0465)
Youth employment*Age dummy for 40 to 44	-0.144** (0.0554)	-0.220*** (0.0768)	-0.0598 (0.0633)	-0.106* (0.0540)
Youth employment*EPL				0.131 (0.105)
Reference age group: 25 to 29				
Youth employment*EPL*Age dummy for 30 to 34				-0.0923* (0.0511)
Youth employment*EPL*Age dummy for 35 to 39				-0.155** (0.0598)
Youth employment*EPL*Age dummy for 40 to 44				-0.185** (0.0683)
Constant	66.57*** (3.138)	73.60*** (2.656)	58.47*** (4.674)	70.81*** (3.768)
Observations	14,406	14,406	14,406	14,406
R-squared	0.940	0.930	0.932	0.948
Notes: Data on employment rate at the country-cohort-age level from OECD. EPL stands for Employment Protection Legislation Index also sourced from OECD. Sample consists of 30 countries from 1960 to 2019.				