



An Age–Period–Cohort Approach to the Incidence and Evolution of Overeducation and Skills Mismatch

Esperanza Vera-Toscano

Elena C. Meroni

PIAAC Conference

Introduction

- Increase in the general **level of education** in all European countries
 - Has labor market **demand** for more educated individuals increased enough to meet the larger **supply**?
 - Did educational expansion lead to more **occupational mismatch (overeducation and overskilling)** ?
-
- Occupational mismatch emerges and risks becoming **persistent** if the **growth in the educational level** of the individuals affected is systematically greater than **the growth of the educational quality of jobs** (Groot 1996)
 - In **highly-skilled**,demanding labour markets, the risks of **permanent overeducation** is lower. Overeducation usually more prevalent among **younger** workers, due to more difficult entry conditions, but it should **diminish over their working life** as workers move along in their careers (Sicherman 1991; Alba-Ramírez 1993)

Introduction

- Different generations (**cohorts**) of individuals experience overeducation or skills mismatch mostly at the beginning of their working lives.
- Its **evolution** and its **persistence** within cohorts will differ depending on the **contextual conditions** uniquely experienced by these individuals particularly during the first phase of their working lives (educational and labour market circumstances, or other macro-economic shocks) .

AIM: New evidence on the **changes in the level** and **persistence** of **occupational mismatch** (education & skill) across countries by investigating whether **differences among generations (cohorts) are at the core of these changes.**

Related literature

- **Why** tertiary education growth ?
 - Increase in the **demand** for skilled labour (Keep and Mayhew 1996; Béduwé and Planas 2003).
 - Driven by direct **public policy** rather than by the free market (Witte 2006; Välimaa et al. 2007): governments have been able to accelerate the development of tertiary education institutions, also to ensure better mobility for younger generations (Collins 1971).
- **What happen** with tertiary education growth?
 - **At individual level: occupational mismatch**, which can be:

Temporary (Sicherman 1991; Robst 1995; Frei and Sousa-Poza 2012).

Permanent (Dolton and Vignoles 2000; Rubb 2013; Büchel and Mertens 2004; Mavromaras and McGuinness 2012; Baert et al. 2013; Kiersztyn 2013; Clark et al. 2017; Meroni and Vera-Toscano, 2017; Wen and Maani 2019).

Related literature

At a macro level:

- Occupational mismatch (particularly overeducation) is becoming a more widespread phenomenon: UK (Green and Zhu, 2010), Sweden (Korpi and Tåhlin, 2009), Poland (Kiersztyn, 2013)
- The levels of overeducation across countries may vary with **macro-economic conditions** and the **business cycle** (Mavromaras et al. (2010), and Pouliakas (2013), is related to variations in the **quality and orientation** of the educational system (Verhaest and Van der Velden (2013) and is higher in country with lower **wage gap** between graduates and upper secondary workers (Croce & Ghignoni, 2012)

Evolution: overeducation has tended to **increase** over time in some European countries but it has remained **static** and has even **declined** in others. (McGuinness et al. 2018)

Data

- 1994–1998 **IALS** (International Adult Literacy Survey)
- 2003–2008 **ALL** (Adult Literacy and Life Skills) survey
- 2011–2012 **PIAAC** (OECD Survey of Adult Skills)
- For **Italy, Norway and the Netherlands**
- Comparable regarding **literacy skills**.
- We are able to go beyond **education mismatch**, investigating also **skill mismatch**

Definitions

Education Mismatch

Compare the **level of education** of the individual with the **modal level of education** of all individuals in the same **country** and **occupation**.

Occupations are identified following the International Standard Classification of Occupations (ISCO) at 1-digit level.

Overeducated: level of education **is higher than the modal level of occupation** in his occupation and country

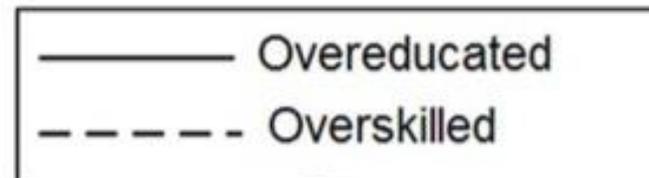
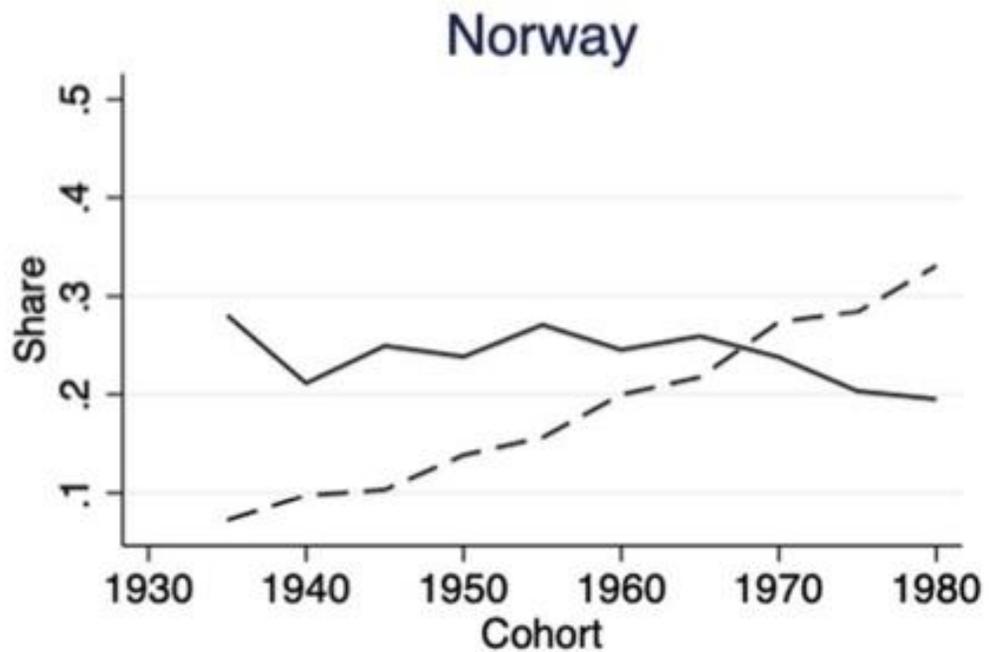
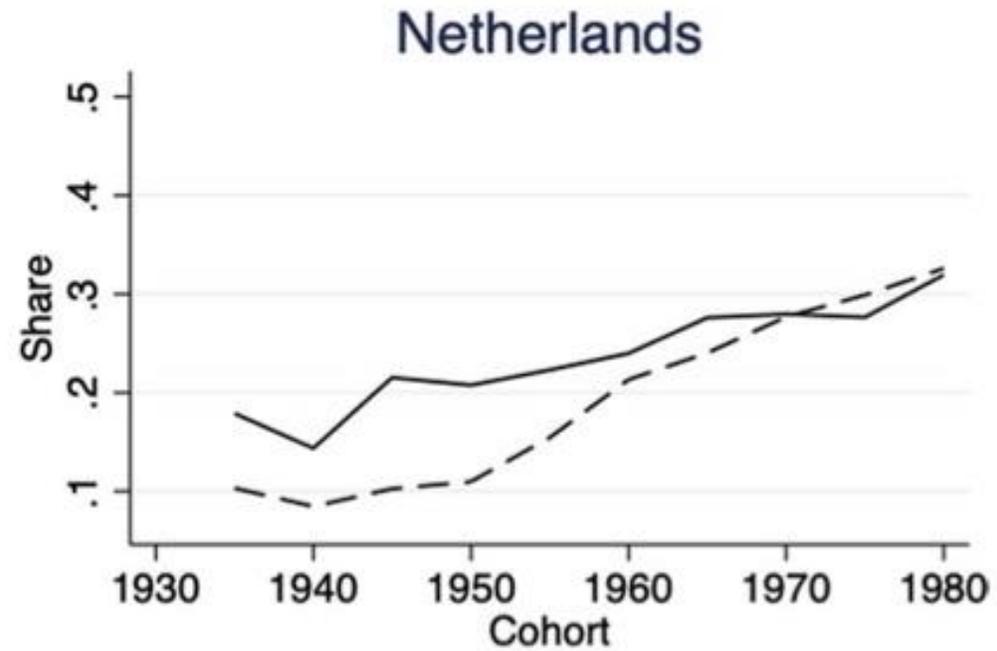
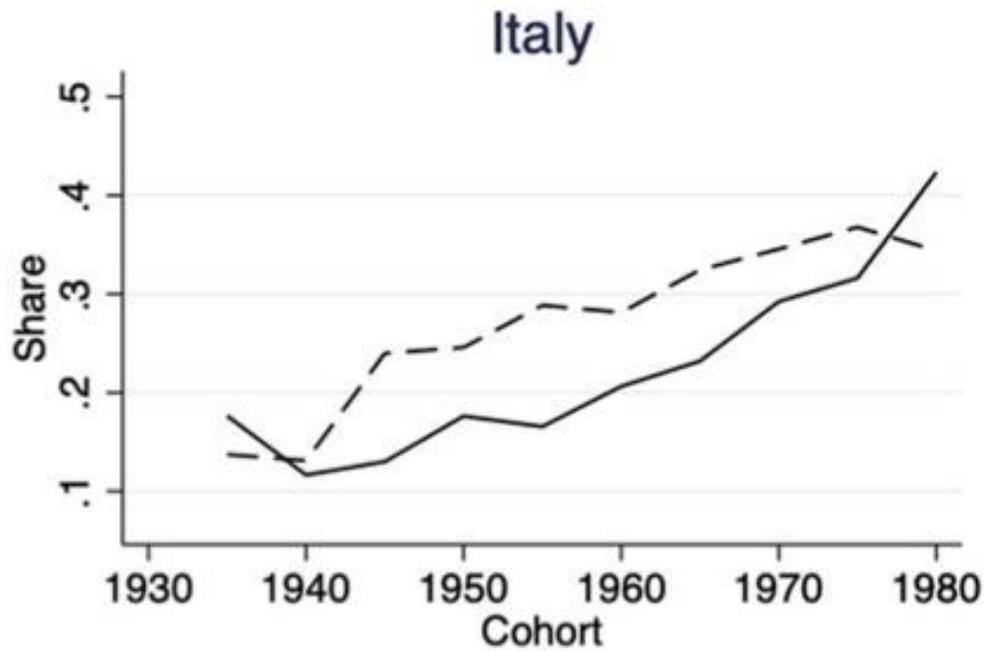
Skills mismatch

- a. Compare the **skill level** of the individual in literacy (as measured by the first plausible value) with the **average skill level** in literacy of all individuals in the same **country** and ISCO 1-digit **occupation**.

Overskilled: literacy skills level is **more than 1 standard deviation higher than the average** in his ISCO 1-digit occupation and country.

- b. Identify individuals with **literacy surplus** if they have **high literacy skills** and **low literacy requirements** in their job (Krahn and Lowe, 1998)

Overskilled: literacy ability level is at least **one category above the literacy requirements** of their job



Age-period-cohort

Change over the **life course** (**age** effects), change over **generations** (**cohort** effects), and change over **time** (**period** effects)

Age effect

Change that occurs **among all cohorts independently of the time**, as each cohort grows older

EX: individuals may gain job experience as they get old and may find a job that better fits their educational level or skill.

Cohort effects

Change that characterizes **populations born at a particular point in time** but which is independent of the process of ageing

EX: educational policies affecting specific generation

Period effects

Change that occurs **at a particular time**, affecting all age groups and cohorts uniformly

EX: a global economic crisis

Each of the three can be always identified by knowing the other two

Age–Period–Cohort Detrended: APCD (Chauvel)

- Aim to determine whether individuals born in **different cohorts** are systematically more/ less exposed to the **risk of overeducation** and **skills mismatch**
- Conventional age-period-cohort (APC) analysis is unable to identify the independent effects of age, period, and cohort (Yang et al. 2008).
- Methodology to detect **cohort nonlinearities** pertaining specifically to the cohort variable and which cannot be explained by the simple combination of age and period: retrieve **nonlinear cohort effects**. The model show which cohorts (age groups or periods) deviate from the trend (“fluctuation”)

$$\left\{ \begin{array}{l} \Pr(y_i^{apc} = 1) = \alpha_a + \pi_p + \gamma_c + \alpha_0 \text{rescale}(a) + \gamma_0 \text{rescale}(c) + \beta_0 + \sum_j \beta_j x_{ij} + f_i \\ \sum_a \alpha_a = \sum_p \pi_p = \sum_c \gamma_c = 0 \\ \text{slope}_a(\alpha_a) = \text{slope}_p(\pi_p) = \text{slope}_c(\gamma_c) \\ \text{with } p = c + a \text{ and restricted to } c_{\min} < c < c_{\max} \end{array} \right. \quad (1)$$

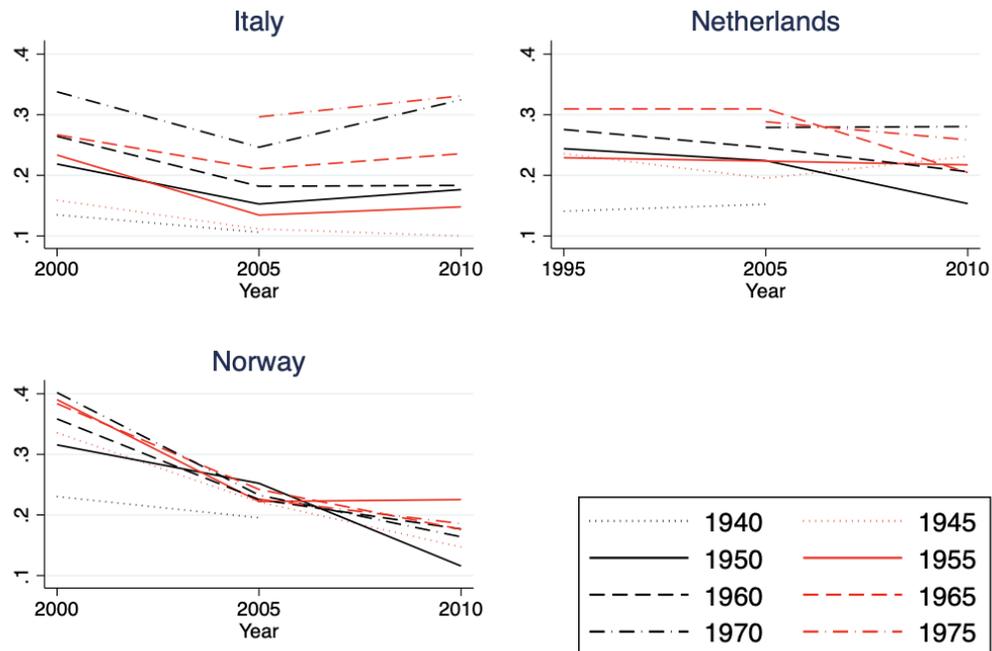
- $x_{i,j}$ are control variables (education, gender, and immigration status)
- $\alpha_a, \pi_p, \gamma_c$ are, respectively, age, period, and cohort effect vectors, which reflect the nonlinear effect of age, period, and cohort as they come with two main constraints: each vector sums up to 0 and has a slope of 0.
- $\alpha_0 \text{rescale}(a)$ and $\gamma_0 \text{rescale}(c)$ absorb the linear trends. The detrended cohort effect coefficients are γ_c .

Overeducation

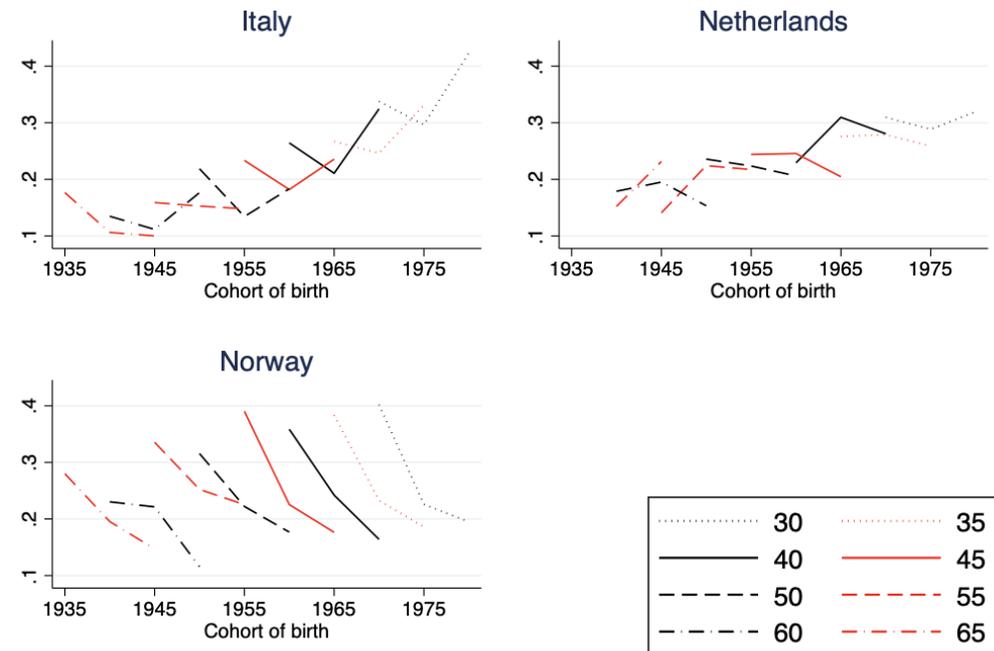
- **Synthetic cohort:** the lines represent birth cohort groups

- **Cohort Diagram:** the lines represent age groups.

Overeducation



Overeducation

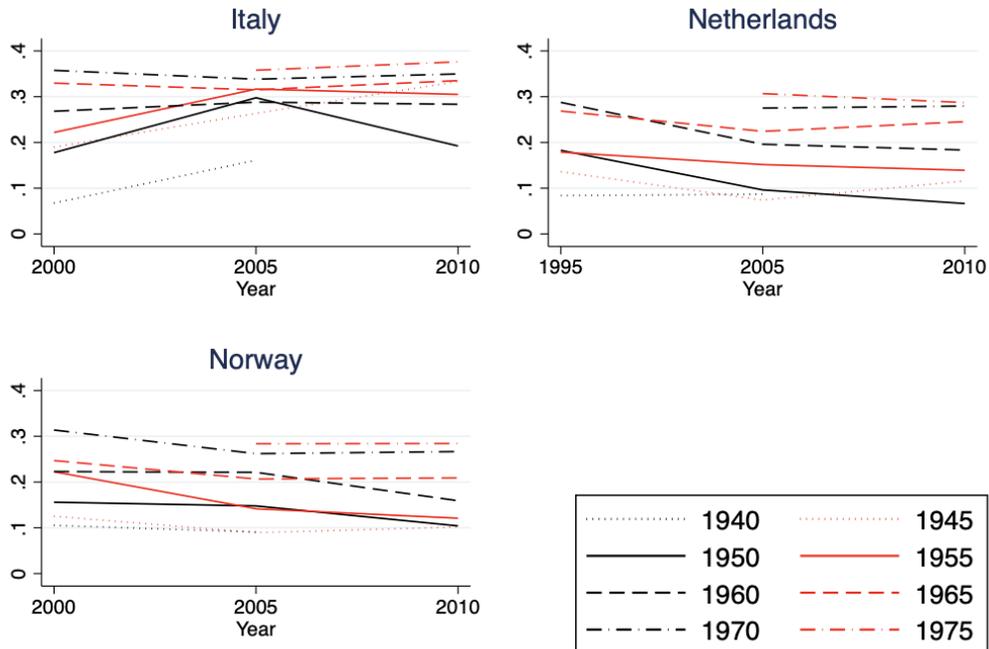


Overskilling

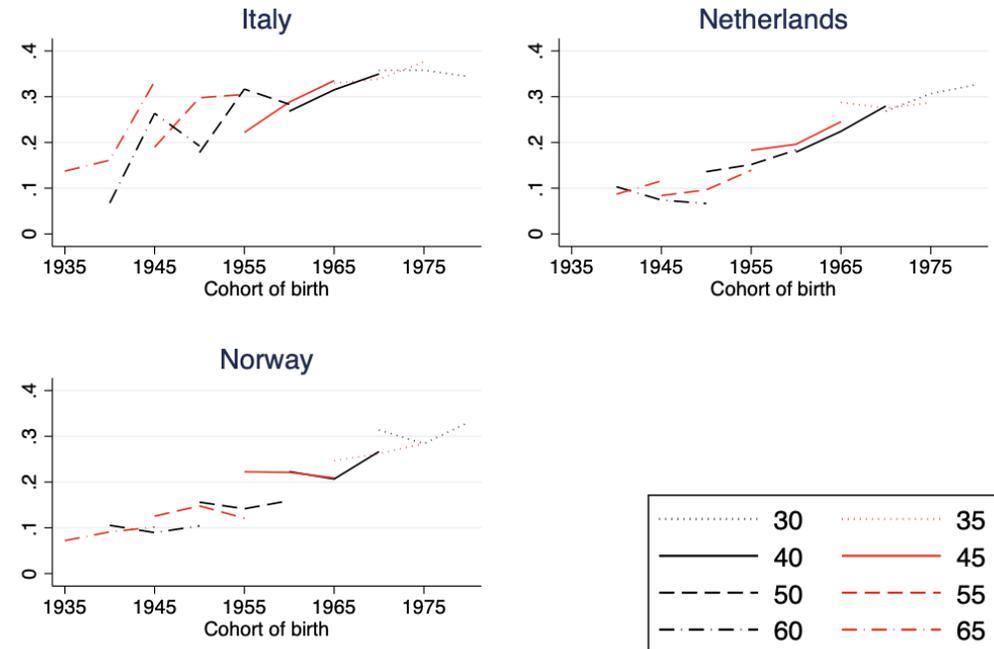
- **Synthetic cohort:** the lines represent birth cohort groups

- **Cohort Diagram:** the lines represent age groups.

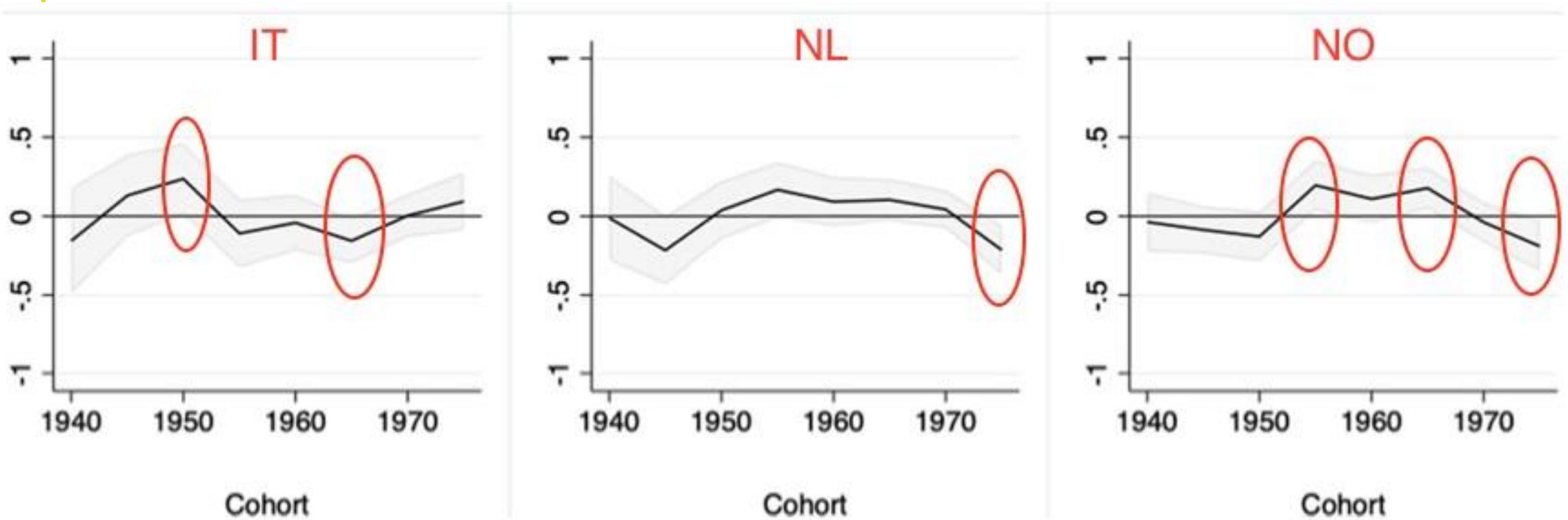
Overskill



Overskill



APCD- overeducation



Discussion overeducation

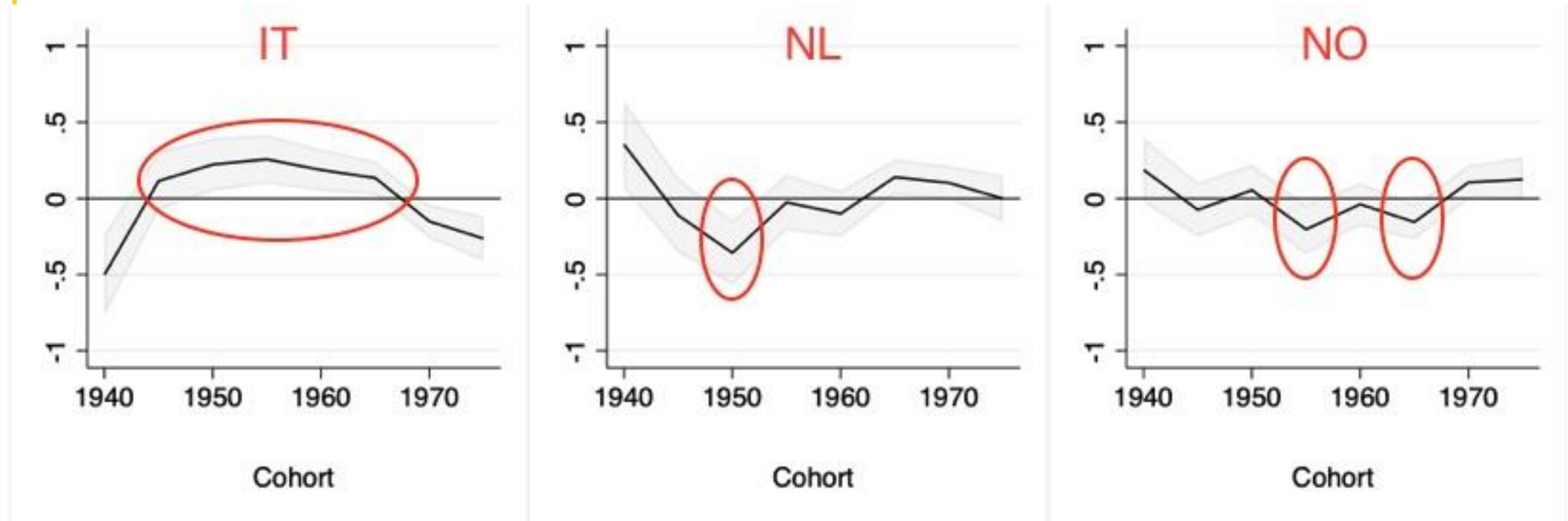
Italy

- 3 reforms, affecting the **cohort of 1950**: compulsory junior high schools + increase access to higher education

Norway

- Increase in the relative **supply** of highly educated workers throughout the 1980s (Kahn 1998 and Salvanes and Forre 1999), but the **demand** for workers with tertiary education, relative to workers with primary education, increased later > Greater risk of overeducation among the 1955 and 1965 cohorts, which vanishes as the demand for workers with tertiary education increased to reach to the situation where the youngest cohort (1975) has a lower risk of overeducation.
- Those born in 1965 and likely to graduate and enter into the labour market around 1991 when the third global recession after World War II hit. Graduating in recession effects Liu et al. (2012)

APCD- overskilling



Discussion: overskill

- **Qualifications** in **Italy** are poor predictors of a person's true skills and competences (OECD 2017). Education titles may diverge considerably from the *true skills* of the workers> difference in the estimates for skills mismatch and overeducation in Italy.
- in Italy, younger cohorts have **higher literacy levels** (Barrett and Riddell 2016)> higher risk of experiencing skills mismatch for the 1950–1965 cohorts when the market was not ready to absorb and fully use the skills gained by the population.
- In the **Netherlands**, younger cohorts have shown an **increase in skills**, although it is modest in size. This might explain the significant difference found for the cohort born in 1965.
- In contrast, in **Norway**, literacy skills seem to have been falling across generations. This result may be the reason why Norway does not exhibit any risk of skills mismatch by cohort and, perhaps, for the lower risk for the 1955 and 1965 cohorts.

Conclusions

- Describe and explain the differences between **birth cohorts** in the risk of **overeducation** and **skills mismatch** in Italy, the Netherlands, and Norway
- We can detect deviations from a trend in cohort effects, which go beyond the simple linear combination of age and period, (**APCD model**)
- We find differential country effects & differences between educational and skill mismatch definitions: **overeducation and overskilling are weakly correlated**
- The second wave of the PIAAC Survey will allow extending this research beyond the three countries considered. More cohorts will also be included, in particular, younger cohorts, which should be the focus of eventual policies

Policy implications:

- More tailored policy response that considers the capacity of the different labour markets to absorb any given increase in educational/ skills supply. Taking specific account of both the **level** and **composition** of current and future labour demands.
- Greater educational attainment is a desirable goal, a corresponding investment in the labour market should be made to ensure that **new generations find a job that fits their level of education and skill.**

Thank you



© European Union 2022

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.