Twin Transitions in the OECD and Developing Countries

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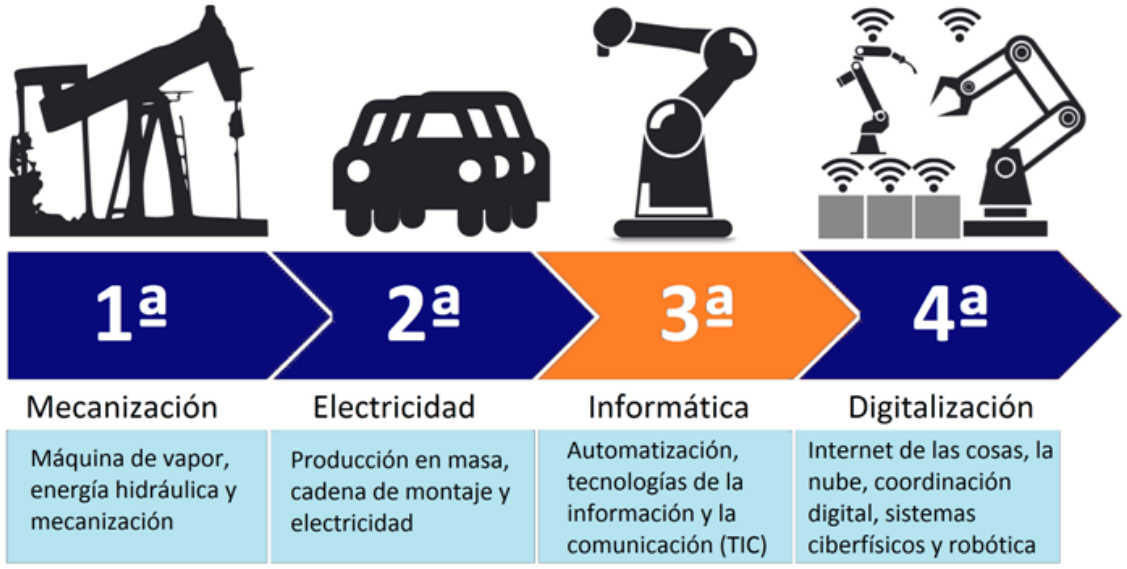
The 4th industrial revolution

- The 4th industrial revolution is changing the nature of work and the labor market.
- The resilience of developing economies seems to be less robust

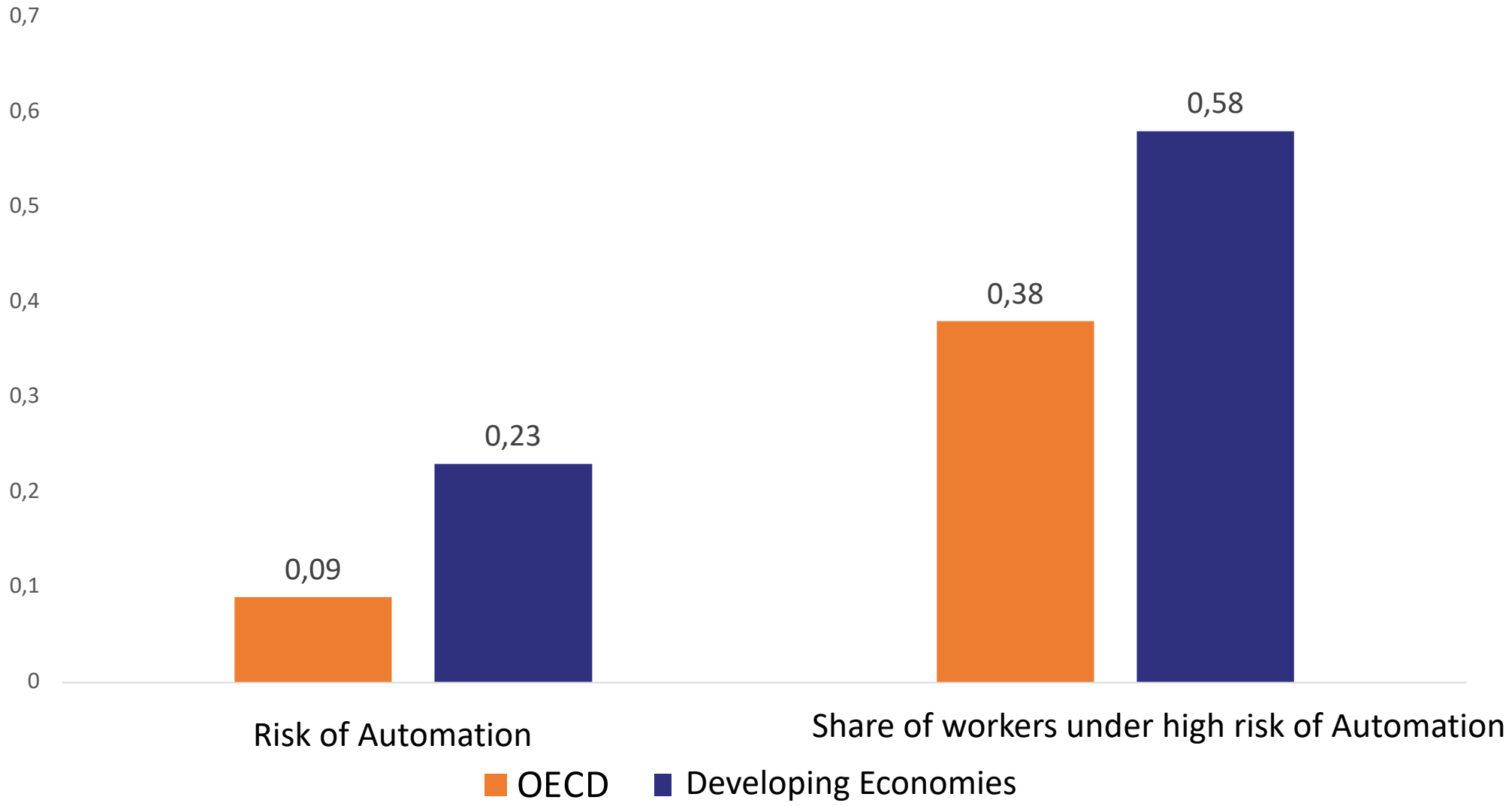
  [Egana-delSol and Joyce (2020), Egana-delsol et al. (2022), Egana-delsol and Micco (2023)]
- The effects differ at the level of:
  - Education (positive) and skills
  - Gender (women more affected)
  - Geography (demographics and economic sector)
- The Covid-19 pandemic accelerated many of these transformations.

  [e.g. Egana-delSol, Cruz and Micco (2022)]



Innovaciones de la 3° Revolución Industrial. Fuente: Economipedia

Risks of Automation: Developing vs OECD Countries



Source: Egaña and Micco 2023

Demographic Heterogeneity in Developing Countries

Table: Automation outputs by education, years of experience, and age

Education Level	Automation Estimation	Experience Level	Automation Estimation	Age	Automation Estimation
Early Childhood	0.71	None	0.64	15—19	0.67
Primary	0.68	Less than 1 year	0.60	20—29	0.57
Secondary	0.57	1—2 years	0.52	30—39	0.57
Bachelor	0.42	3—5 years	0.48	40—49	0.57
Master	0.37	6—10 years	0.43	50—59	0.56
Ph.D.	0.26	More than 10 years	0.44	60—69	0.55

Source: Egaña and Micco 2023

Demographic Heterogeneity in Developing Countries: Skills

Table: Marginal Effects of Different Types of Tasks/Skills on Automation Risk

(a) Full Sample

	Reading	Writing	Numeracy	Interpersonal	Autonomy at Work Score	Physical Work	Frequency of Thinking and Learning New Things Score
Low	-0.131*** [0.017]	-0.012 [0.016]	0.213*** [0.017]	-0.026 [0.018]	-0.021 [0.021]	0.044 [0.023]	-0.061*** [0.015]
Medium	-0.261*** [0.024]	-0.148*** [0.032]	0.246*** [0.020]	-0.070*** [0.018]	0.019 [0.022]	0.082*** [0.024]	-0.126*** [0.017]
High	-0.469*** [0.030]	-0.181*** [0.043]	0.017 [0.030]	-0.222*** [0.018]	-0.066* [0.029]	0.147*** [0.024]	-0.198*** [0.021]

Notes: All the models control for level of education, age and gender. The errors are clustered at the country level in the full sample model. N(Exp.Factor) means that is the total number of observations in the sample multipled by their expansion factor at country level. In the frequency of thinking and learning new things score, the category 'low' accounts for less than once a month, 'medium' for at least once a week or month, and 'high' for every day.
Robust standard errors in parentheses, $***p < 0.01, **p < 0.05, *p < 0.1$.

Source: Egaña et al., 2022.

Risk of automation, task measures and workers' characteristics: Estimated marginal effects.

	Four LAC Countries		Bolivia		Chile		Colombia		El Salvador	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Marketing & Accounting	0.005	0.056***	0.039***	0.069***	-0.005	0.096***	0.006	0.025*	0.030***	0.049***
	[0.009]	[0.008]	[0.010]	[0.009]	[0.016]	[0.015]	[0.011]	[0.011]	[0.005]	[0.005]
Readiness to learn & Creativity	-0.009	-0.016*	-0.018*	0.000	0.000	0.001	-0.021*	-0.037***	0.016***	-0.021***
	[0.008]	[0.008]	[0.009]	[0.010]	[0.013]	[0.015]	[0.010]	[0.010]	[0.004]	[0.005]
Management & Communication	-0.057***	-0.064***	-0.073***	-0.110***	-0.043**	-0.090***	-0.058***	-0.041***	-0.065***	-0.067***
	[0.009]	[0.009]	[0.010]	[0.011]	[0.015]	[0.014]	[0.010]	[0.012]	[0.006]	[0.006]
Self-organization	-0.021**	-0.011	-0.013	0.011	-0.018	-0.036*	-0.026**	0.005	-0.011*	-0.025***
	[0.008]	[0.009]	[0.009]	[0.009]	[0.013]	[0.014]	[0.009]	[0.009]	[0.004]	[0.005]
STEM quantitative	-0.016	-0.018	-0.027*	-0.047***	-0.038*	-0.042*	0.001	0.016	-0.015**	-0.019***
	[0.009]	[0.010]	[0.011]	[0.011]	[0.015]	[0.019]	[0.011]	[0.013]	[0.005]	[0.006]
ICT	-0.018*	-0.013	0.024*	0.018	-0.02	-0.052**	-0.013	0.001	-0.013*	0.030***
	[0.009]	[0.009]	[0.011]	[0.010]	[0.017]	[0.017]	[0.010]	[0.010]	[0.005]	[0.006]
Physical	0.039***	0.001	0.071***	0.029***	0.022	0.011	0.045***	-0.013	0.045**	-0.013*
	[0.008]	[0.008]	[0.008]	[0.009]	[0.013]	[0.013]	[0.010]	[0.011]	[0.017]	[0.006]
High level of education (>13)	-0.070***	-0.096***	-0.089***	-0.069**	-0.117***	-0.067*	-0.023	-0.117***	-0.067***	-0.045***
	[0.016]	[0.017]	[0.017]	[0.022]	[0.029]	[0.029]	[0.023]	[0.024]	[0.009]	[0.010]
Age group 26–40	-0.038*	-0.072***	-0.086***	-0.044	-0.047	-0.053	-0.016	-0.064*	-0.047***	-0.034**
	[0.017]	[0.021]	[0.023]	[0.027]	[0.039]	[0.044]	[0.022]	[0.028]	[0.011]	[0.013]
Age group 41–60	-0.069***	-0.110***	-0.025	-0.089**	-0.079*	-0.125**	-0.04	-0.095**	-0.091***	-0.081***
	[0.016]	[0.022]	[0.024]	[0.029]	[0.038]	[0.043]	[0.022]	[0.030]	[0.011]	[0.013]
Country FE	Yes	Yes	No	No	No	No	No	No	No	No
Number of observations	24,943	18,996	5110	4217	3013	2449	5485	3974	11,335	8356

Source: Authors' calculation based on the PIAAC (Chile, 2014) and STEP surveys (Bolivia, 2012; Colombia, 2012, El Salvador, 2013).

Notes: Robust standard errors between brackets. The table shows the marginal effects obtained after estimating model (1) with the final set of weights.

*** Significant at 1%

** 5% and

* 10%. Sample of employed urban women and men aged 18–60. We excluded workers from the mining and quarrying, agriculture, and forestry and fishery sectors.

Source: Egaña et al., 2022.

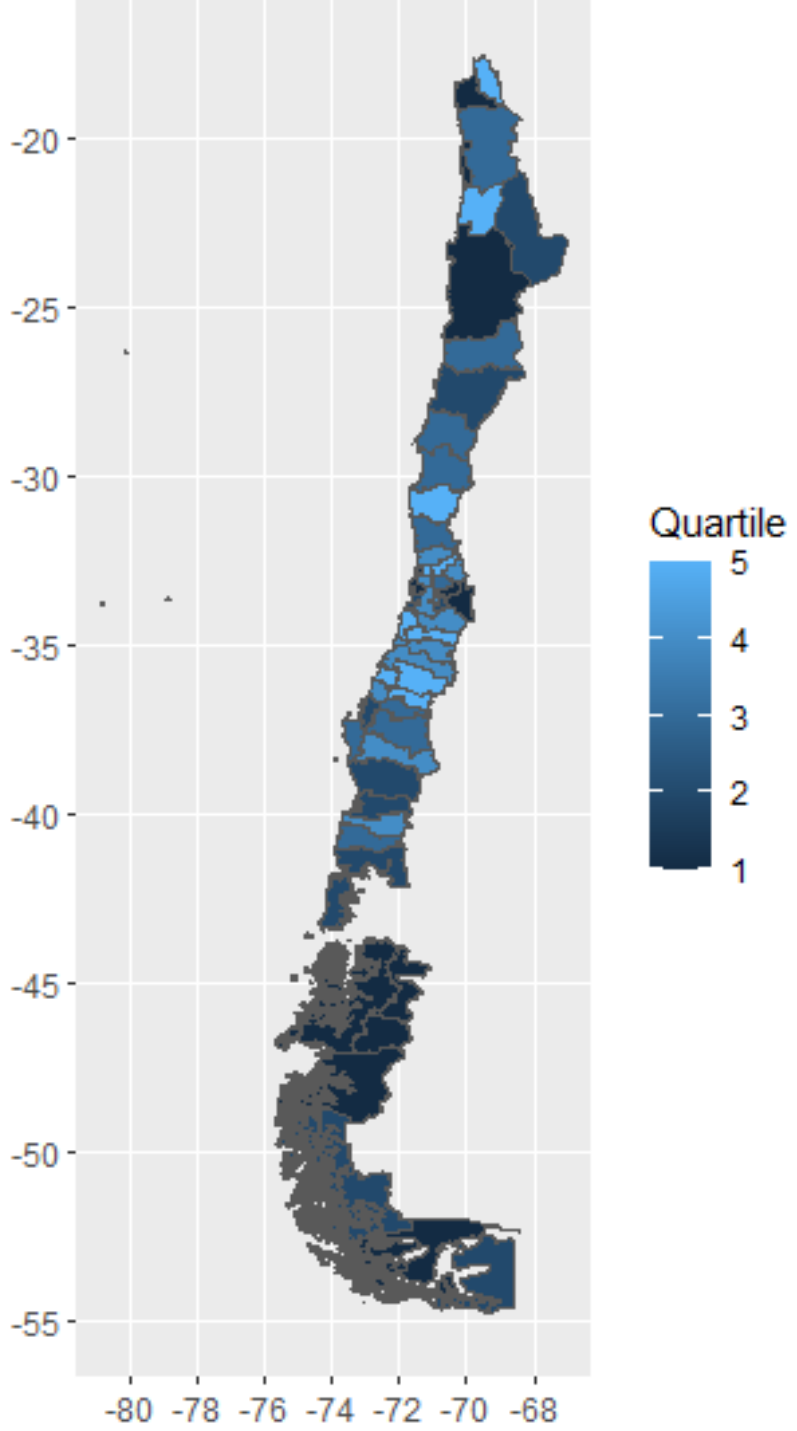
Gender Heterogeneity in Latin America

Skills with the lowest risk of automation

Men	Women
• Higher level of education • Management and Communication • Self-organization • Information Technologies	• Higher level of education • Management and Communication • Willingness to learn and creativity.

Geographical Heterogeneity

Risk of automation quartiles in Chile



Source: Egaña, Cruz y Micco (2022)

Chile pre Covid-19

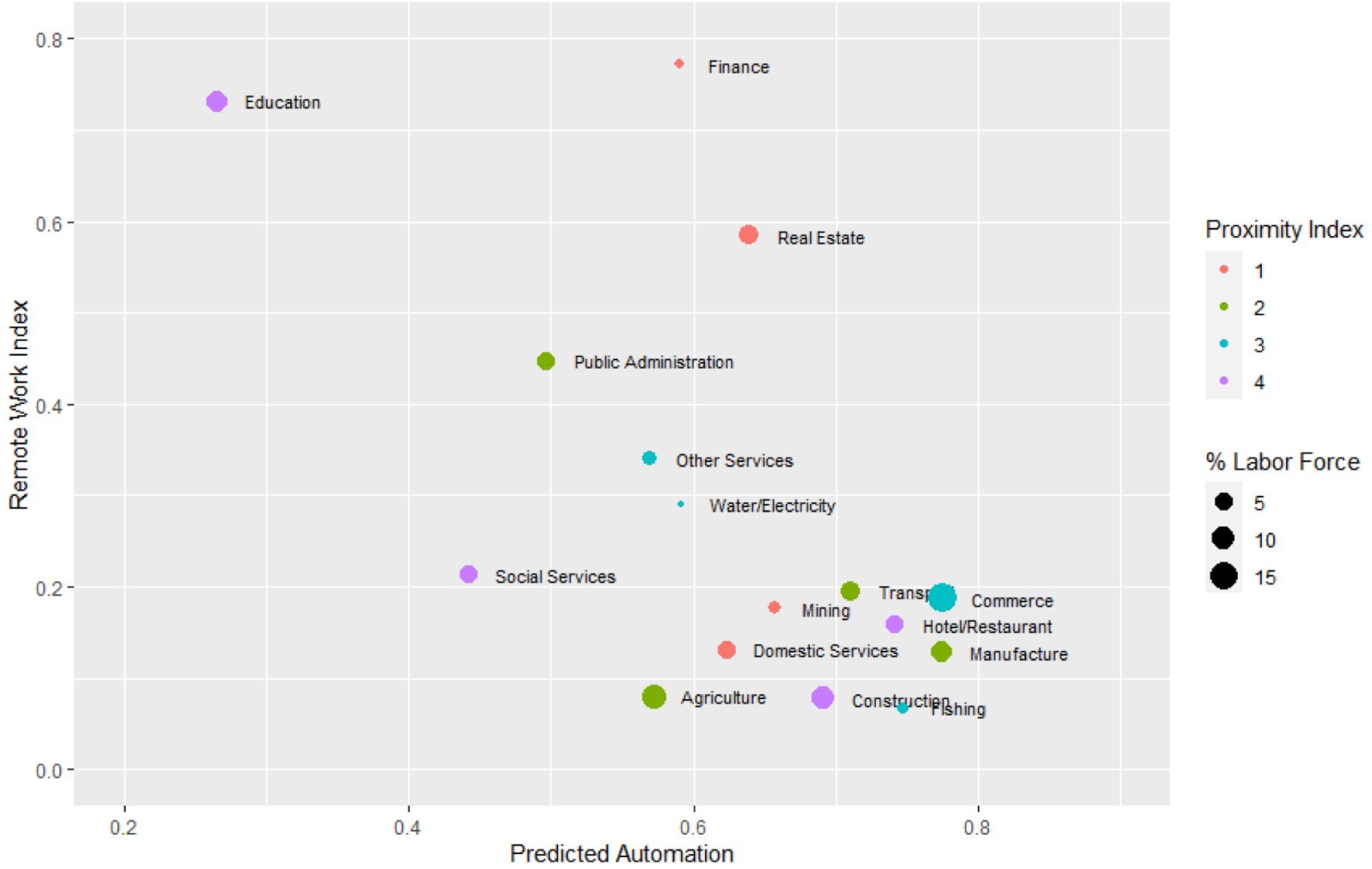
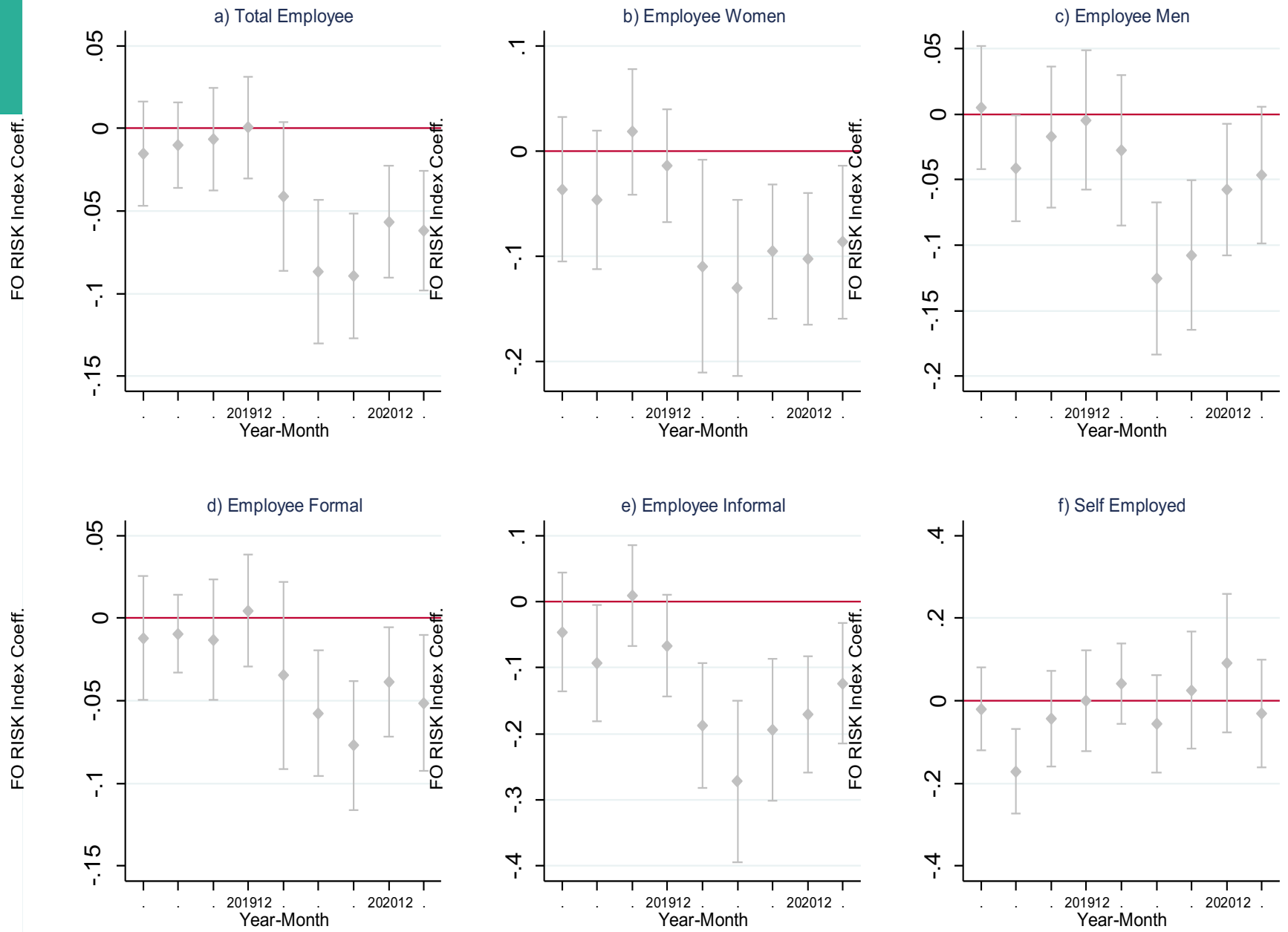


Fig. 2. Predicted Automation, Remote Work, and Proximity by Economic Sector. Note: Each circle represents a sector. The size of each circle represents the Labor Force calculated with CASEN (2017). The x-axis plots the predicted automation of each sector estimated using Autor et al. (2003). The farther to the right, the more probability to be automated. The y-axis plots the remote work index built by Dingel and Neiman (2020). Farther up, employees work from home more commonly. Finally, the color of the circle corresponds to the quartile of each sector in the proximity index created by Beland et al. (2020). Sectors in the 4th quartile have ximity with their coworkers. Results are similar if we use either Frey and Osborne (2017).

Source: Egaña, Cruz y Micco (2022)

Total Employment and Risk of Automation

CHILE: 2018-2021



Source: Egaña, Cruz y Micco (2022)

Demand and Suppy of Green Jobs (OECD, 2023)

1. **Climate action and policy will need to contribute to a "greening" of the labor market, which has four major labor market implications (OECD, 2023).**
    1. First, it will lead to the creation of new types of jobs.
    2. Second, it will entail the loss of some existing, "old" jobs.
    3. Third, it will cause a shift in the skills required in many jobs in the economy.
    4. Fourth, the green transition has a strong local angle. Risks and challenges in terms of jobs are uneven and are often concentrated in specific regions.

Sounds very similar to the 4th Industrial Revolution!

Demand and Suppy of Green Jobs (OECD, 2023)

1. A green skills shortage across the could jeopardise the race to reach net zero by 2050.
2. This is even more pronounce in developing economies.
3. The share of workers in green-task-jobs – is defined as jobs where at least 10% of tasks directly supports sustainable development
4. These Jobs grew just 2 percentage points across OECD countries over the last decade with significant differences within countries.
5. Without urgent action to boost skills, the green transition could deepen inequalities and threaten progress towards 2050 net-zero goals.

Sounds very similar to the 4th Industrial Revolution, again!

What has Chile done?

Expert's Task Force on the Future of Work at the Senate of Chile

- Over 20 working sessions.
- 16 permanent members and 20+ participants (including remarkable presentation of the OECD's Labor directorate).
- I. Guidelines for a strategy for the future of work in Chile
- II. Main challenges for the future of work in Chile
  - Gender and regional inequalities, 4th industrial revolution, aging, migration, climate change.
- III. Areas of public policy
  - Continuous educational training throughout the life cycle
  - Support disadvantaged groups and workers in job transitions
  - Strengthening of worker organizations and mechanisms for social dialogue
  - Generate more and better labor data
  - Reduce gender gaps (participation, salaries, unpaid work, etc.)
  - Reduce territorial inequalities
  - Among several others.

What can we do about it?

- We need an educational revolution!
  - Focus on risk-reducing skills for men and women:
    - Creativity
    - Self-organization
    - Management and communication
  - Formation of advanced human capital in strategic areas

    (e.g. advanced green Jobs).
  - Education for environmental and social sustainability.
  - Continuous learning and training
    - **Digital Talent**
    - **Green Talent**
  - **Generate public policies to foster the transition: e.g. Digital Talent Program for Chile.**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Digital Talent Program (TD)

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- Public-private partnership to foster training for the digital economy.

- Objective: increase skills according to the demands of the digital economy.

- Methodology: “Bootcamp” or short cycle courses.
  - DT offers introductory programs, and to a more limited degree, specialized courses.(i.e. Java developer, JavaScript, Python, Android applications)
  - Synchronous online classes.
  - Intensive full-time training, from 402 to 480 teaching hours (5 to 6 months).
  - **Key:** DT considers a job readiness module → Employability focus

- Egaña, Neilson, and Humphries are conducting an impact evaluation of DT on labor market outcomes.
- By exploiting the selection rule to make causality plausible, we estimate impact of the program.
- The Budget Office, at the Ministry of Finance, funds this evaluation.

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Preliminary Results of the “Digital Talent Program”

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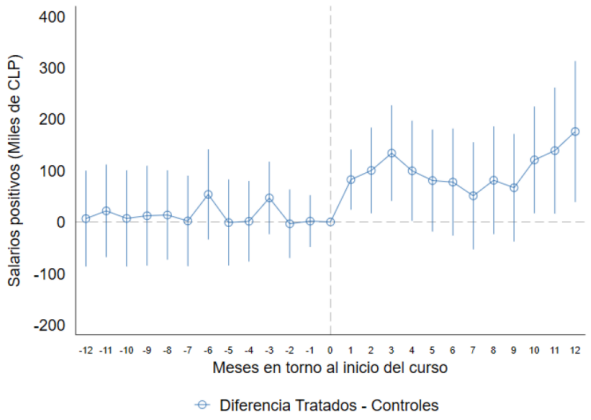
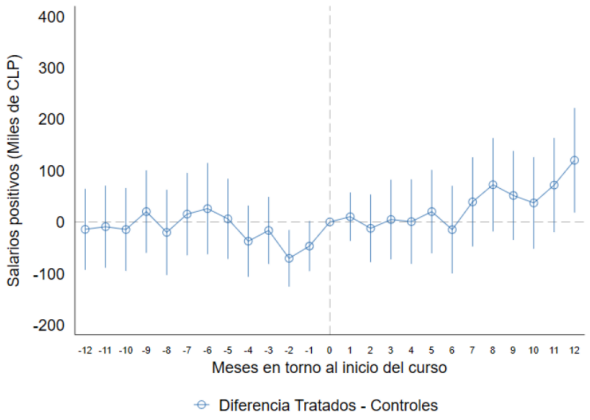
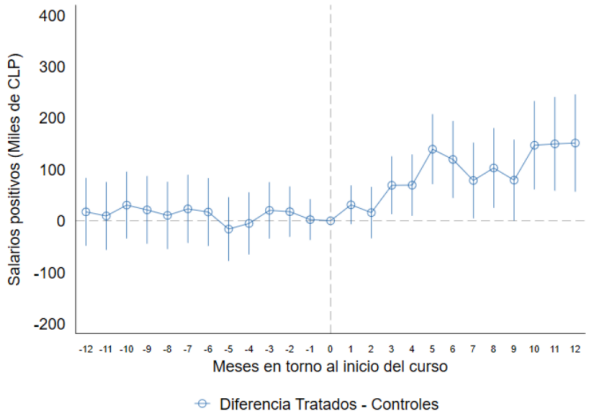
Figure: Effects on Total Earnings



(a) Business

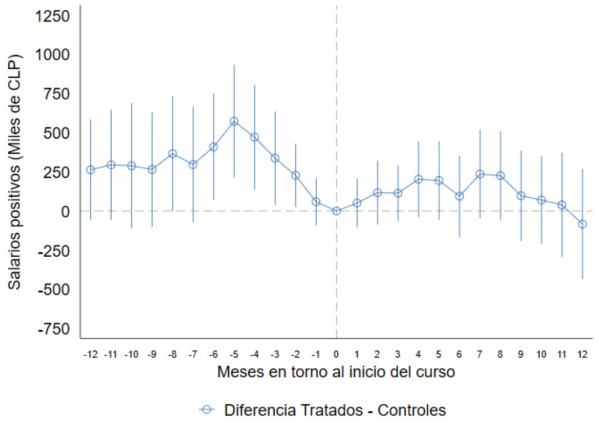


(b) Art and Arquitechture

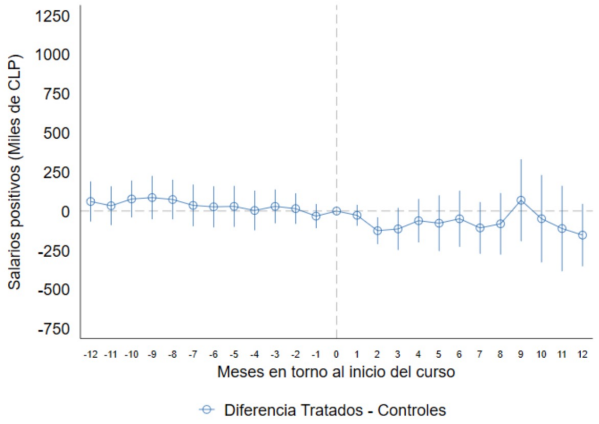


(c) Technology

Figure: Effects on Total Earnings



(a) Humanities



(b) Health

Taking together, these results open more questions than provides answers.

- How do we upskills and reskills the indivuals at risk of automation?
- How do we train the individuals for the transition to a green economy?
- What is the role of the public sector? The private sector? A partnership?
- How do we deal with these twin transitions that share similar challengesm but goes at different speed?

Thank you!

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