

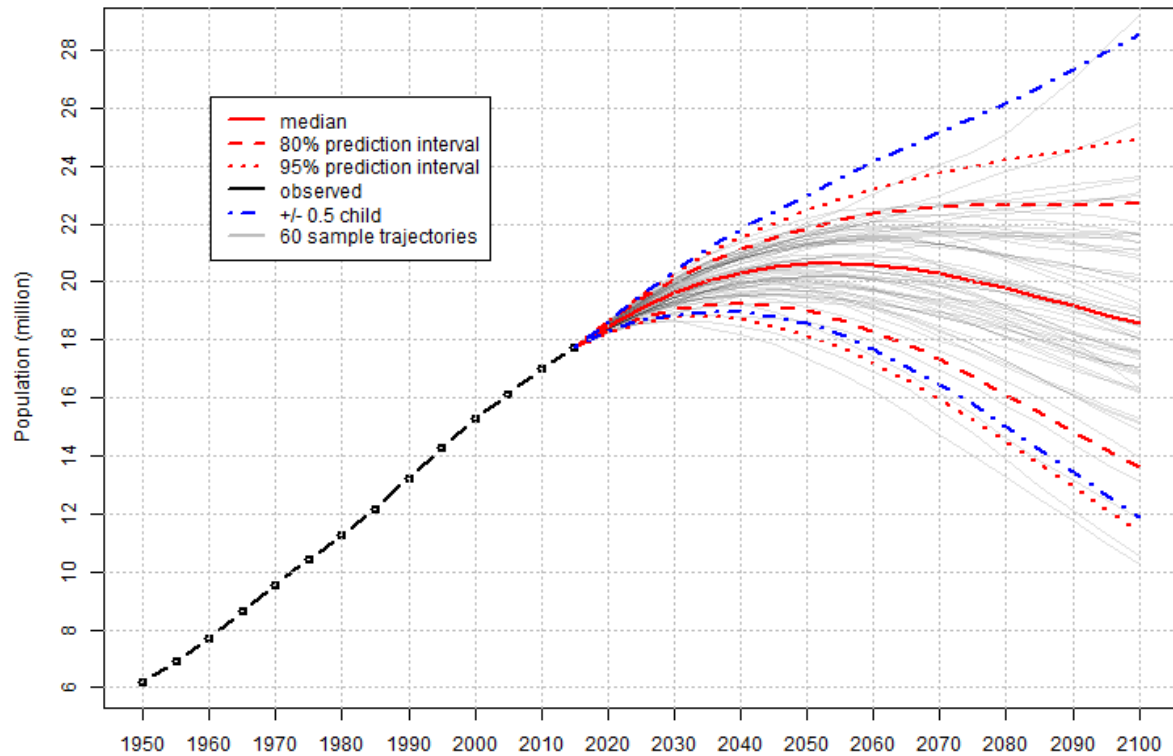
# *The future of the labor market in light of demographic and technological changes*

**Vegard Skirbekk**  
Columbia University

# Demographic context – Chile's demographic window of opportunity

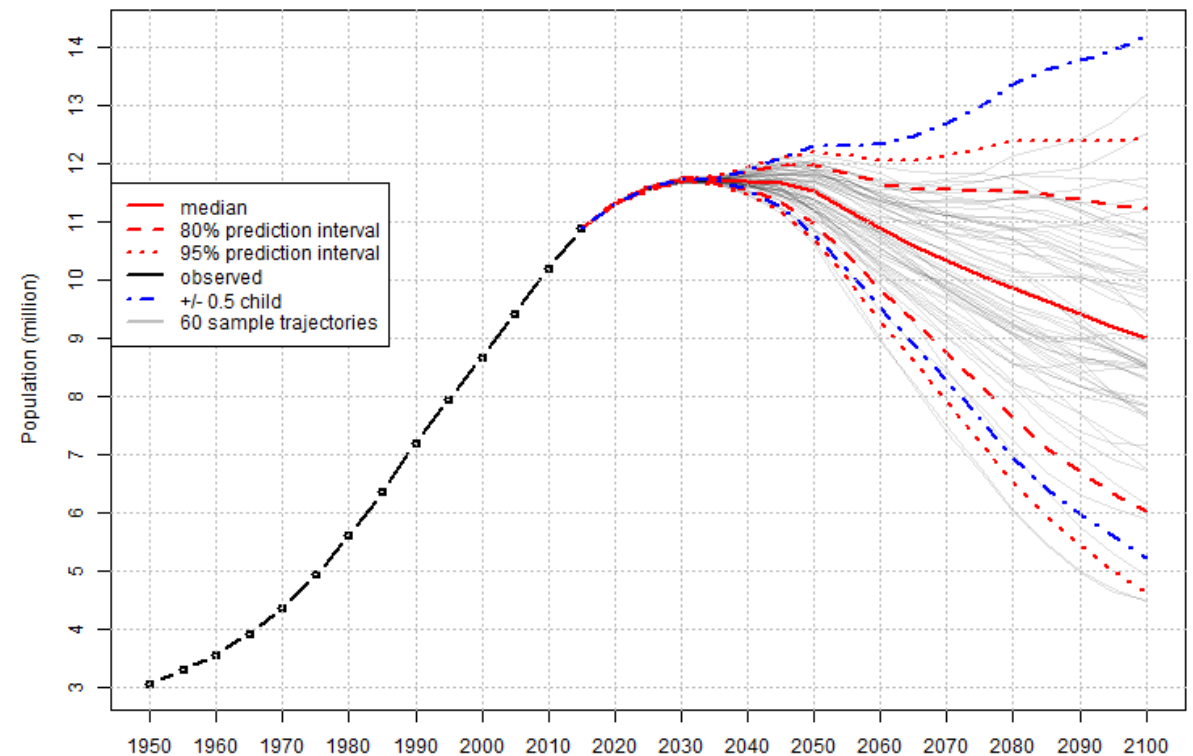


Chile: Total Population



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017).  
World Population Prospects: The 2017 Revision. <http://esa.un.org/unpd/wpp/>

Chile: Population (Age 20-64)



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017).  
World Population Prospects: The 2017 Revision. <http://esa.un.org/unpd/wpp/>



# Causes of robotization

- Robots and automization increasingly used
  - to reduce costs, raise quality and productivity
- Even jobs previously thought to be difficult to automate (e.g., involving judgement or dexterity) increasingly carried out by machines (Zujevs et al. 2015)
- Human-machine interaction more common



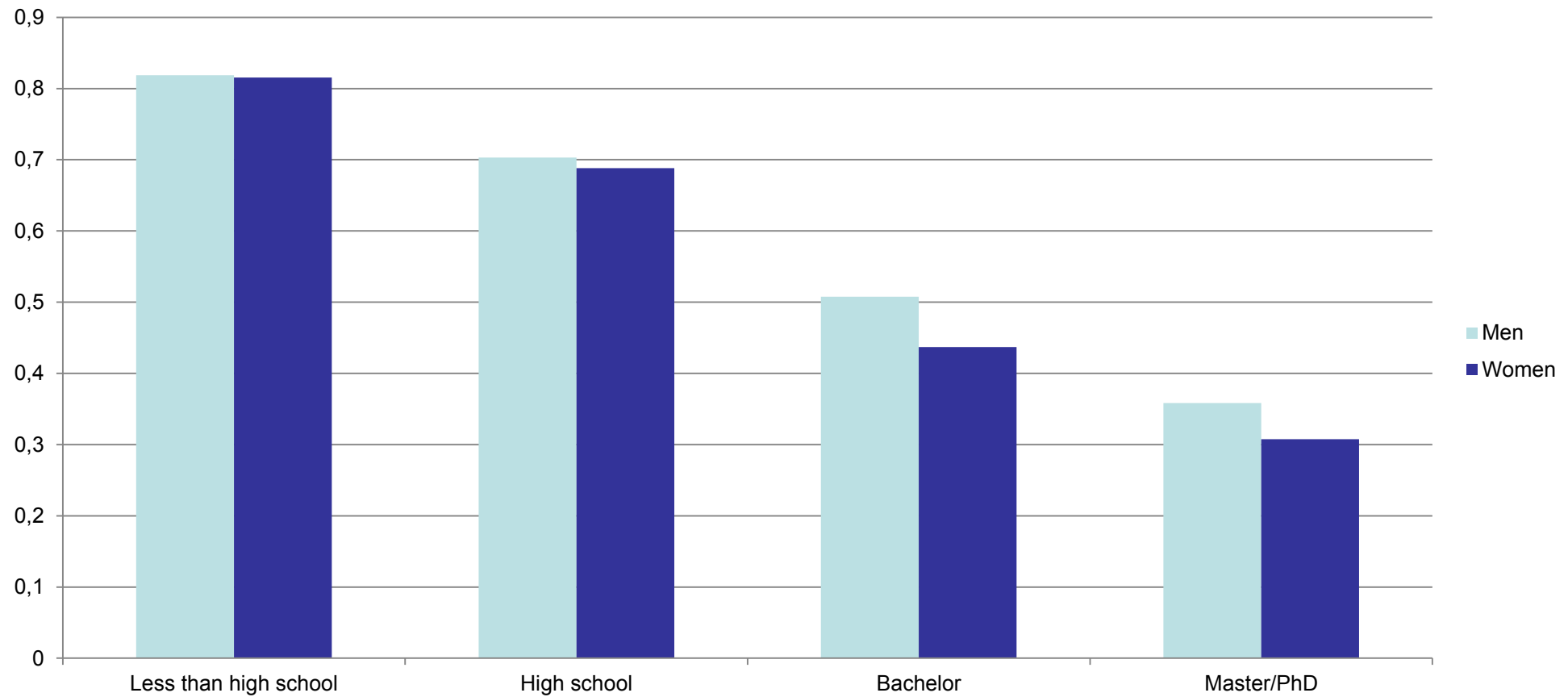


# (Gu)es(s)timates of future employment loss

- High, but uncertain estimates
  - Frey and Osborne (2013) estimate that 47% of jobs in the United States (US) are at risk of disappearing.
  - Bowles (2014) estimates that *more than half* of EU jobs are at risk of automation.
- Low salaries, poor infrastructure and lower spending power in some countries can lower benefits of robotization (until costs fall)



# Education and likelihood of job loss





# High skilled workers increasingly in demand

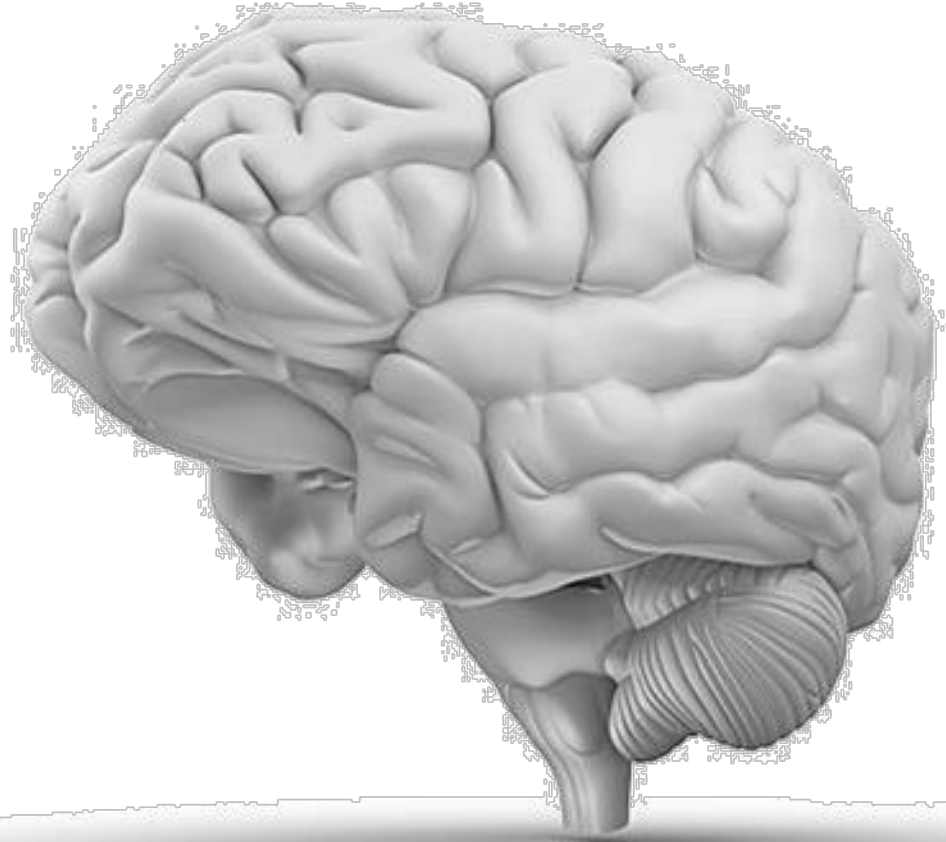
- New jobs mainly high skilled
- Fewer low skilled workers needed
  - Clearly defined and repetitive jobs – requiring low education – disappear
- Cognitive skills (problem-solving, innovation) increasingly in demand
  - «Skill biased technical change» ongoing for more than a century
  - New job creation also driven by aging, changes in demand (personal interaction, health)

# Policies

- Need to boost education and skill levels to match future labour demand
- Incentivize better schooling, life-long learning, healthy lifestyles
- Policies for families that can raise equity and productivity
- Reduce unhealthy lifestyles, including overweight/obesity
- Raise female employment

# Education and cognition

Cognition most important determinant of labour productivity



Cognitive function is an important determinant of individual and national productivity, health and social activity.

# Chile

This section presents country performance compared to the OECD average and medium term trends. It covers all the main PISA subject areas and a summary for the equity challenges the country might face. Scroll down for more detailed indicators and cross country comparisons.

## PERFORMANCE

Science



Mathematics



Reading



MIN ———●———|——— MAX

Not as good as OECD average - stable since 2006

MIN ———●———|——— MAX

Not as good as OECD average - stable since 2006

MIN ———●———|——— MAX

Not as good as OECD average - stable since 2006

## EQUITY

Boys vs girls



Social background



Immigrant students

MIN ———●———|——— MAX

Not as good as OECD average - stable since 2006

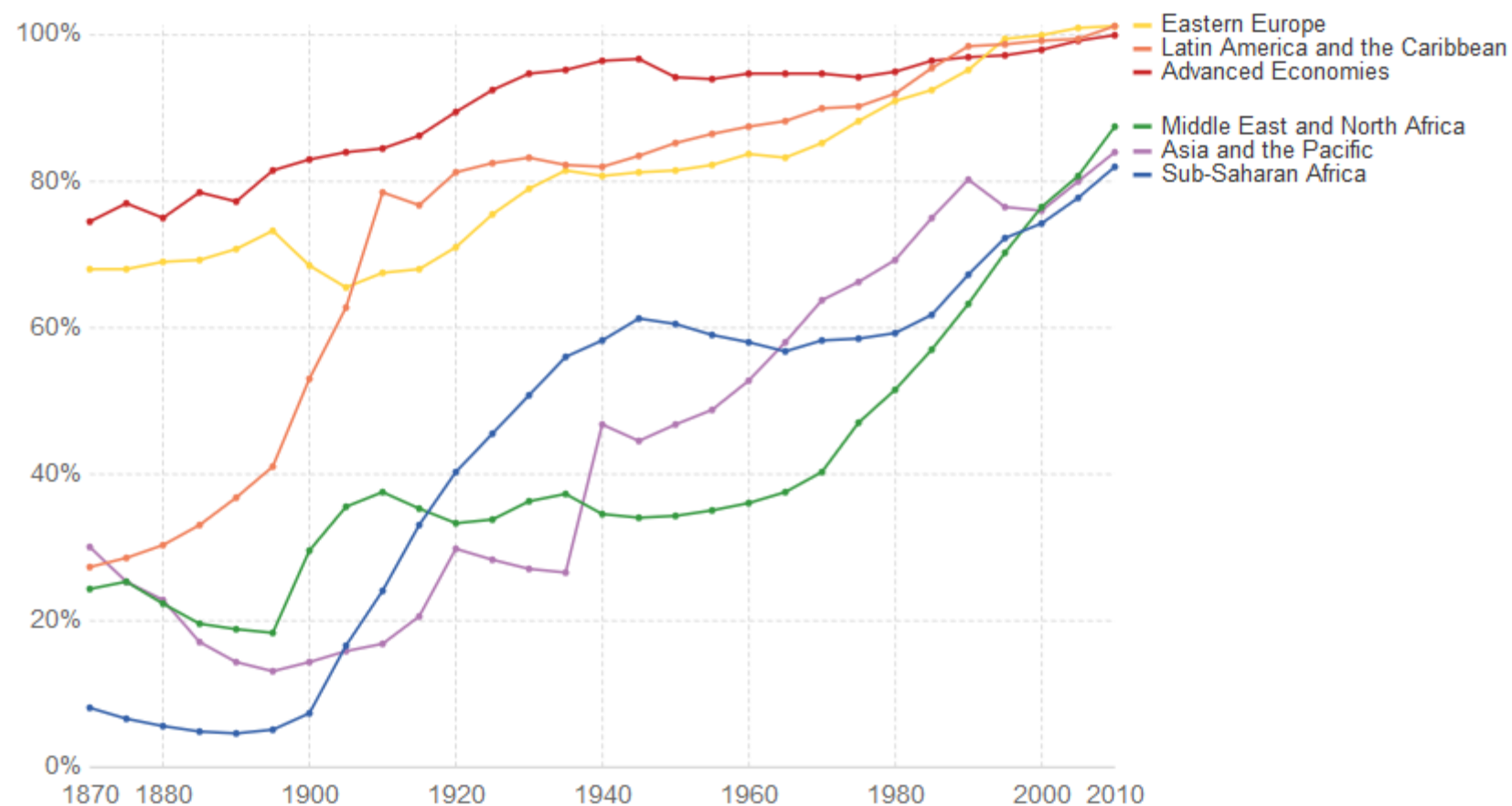
MIN ———●———|——— MAX

Not as good as OECD average - improvement since 2006

No data available

## Gender ratios for mean years of schooling

Female-to-male ratio of average years of schooling, expressed in percents. All education levels for population aged 15-64. Regional estimates are population-weighted averages.



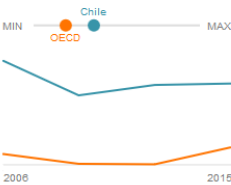
Source: Lee and Lee (2016)

### Share of low performers

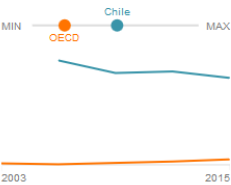
Low performers in science are unable to use basic or everyday scientific knowledge to interpret data and draw a valid scientific conclusion. In mathematics, they cannot compute the approximate price of an object in a different currency or compare the total distance across two alternative routes. In reading, low performers struggle with recognising the main idea in a text.



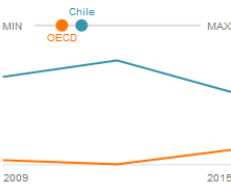
Science



Mathematics



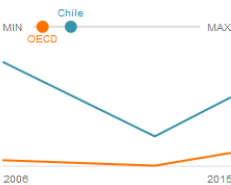
Reading



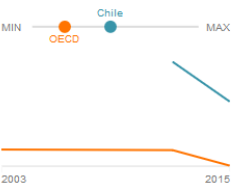
### Performance gap between boys and girls

In most countries, boys perform slightly better than girls in science. However, top-performing boys outperform top-performing girls by a large margin in many countries. Boys outperform girls in mathematics in most countries while girls outperform boys in reading in virtually all countries and economies. The charts below refer to the size of the gap in favor of boys or girls.

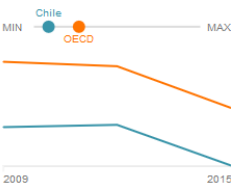
Science



Mathematics



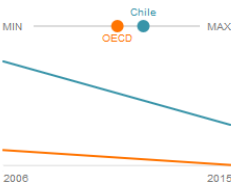
Reading



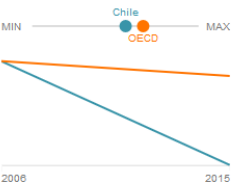
### Social equity

Schools should provide a good education for all students, regardless of their parents' education or career. PISA assesses to what extent differences in education outcomes are associated with the social status of parents as well as the performance gap between advantaged and disadvantaged students. It also identifies the share of students who perform well, despite coming from disadvantaged backgrounds, known as resilient students.

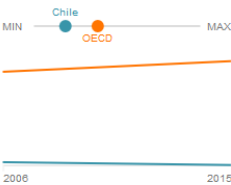
Impact of social background



Performance gap



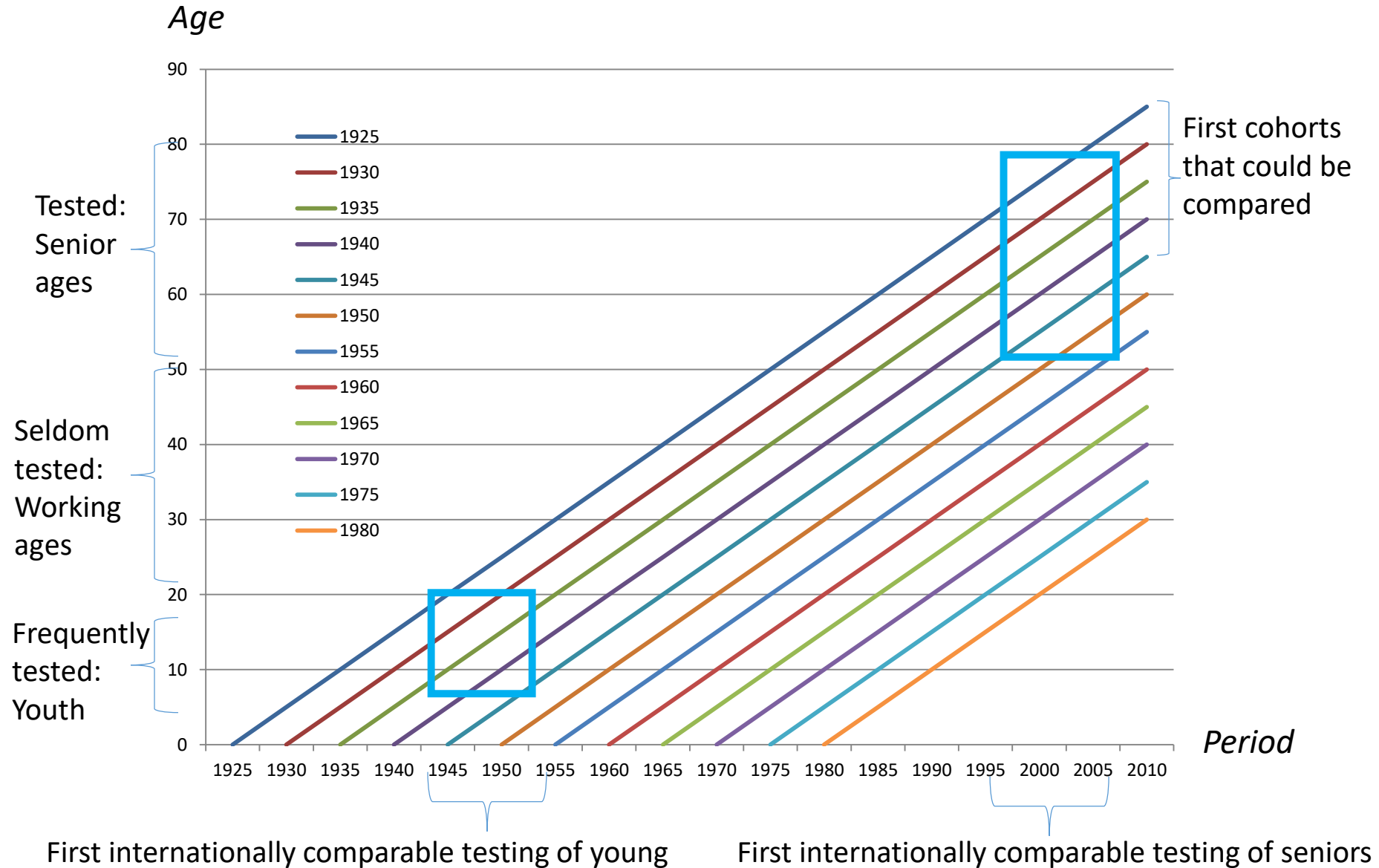
Resilience



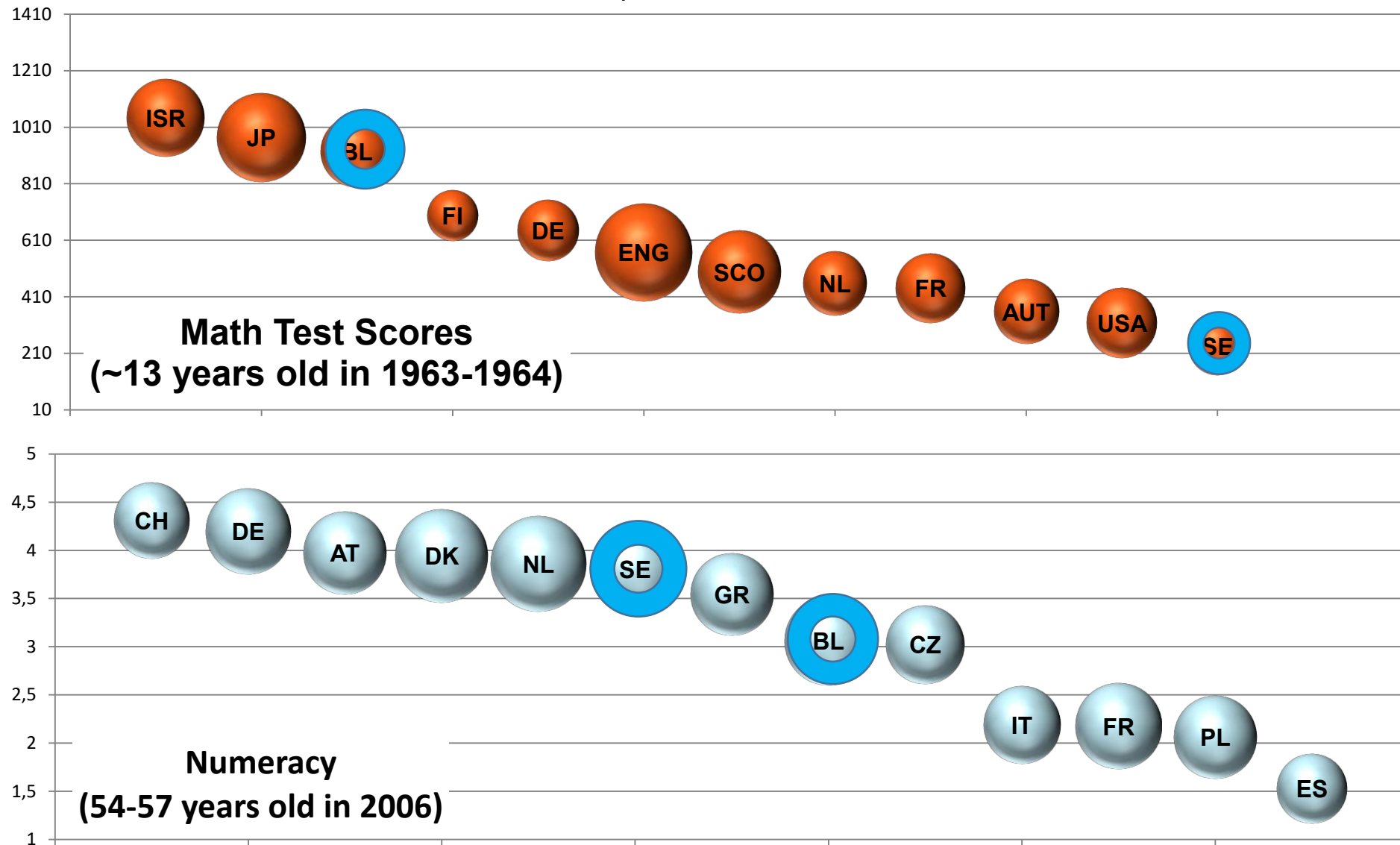


# Focus on cognition over the life cycle

- Maintaining cognition central for how well one ages



Some countries boost cognition over the life cycle; others lose abilities. An example: The 1949-1952 cohort



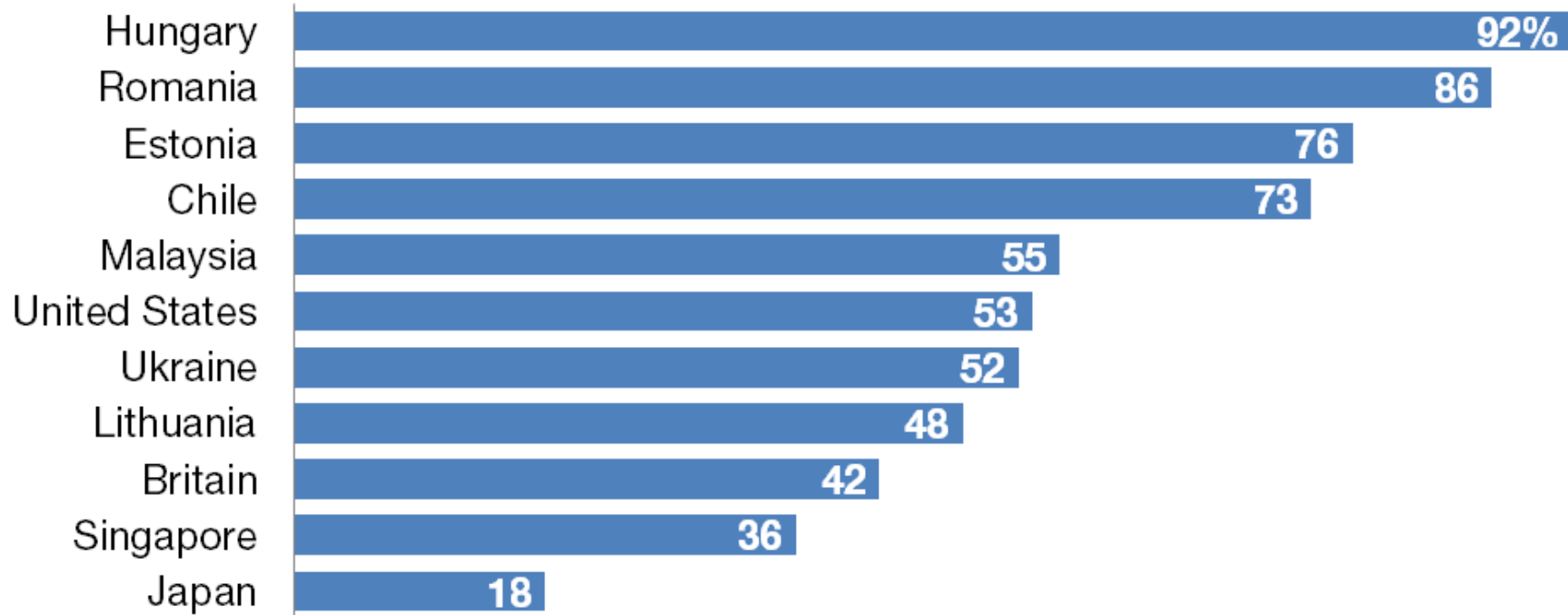
(Skirbekk et al. 2013)

# Consider costs?



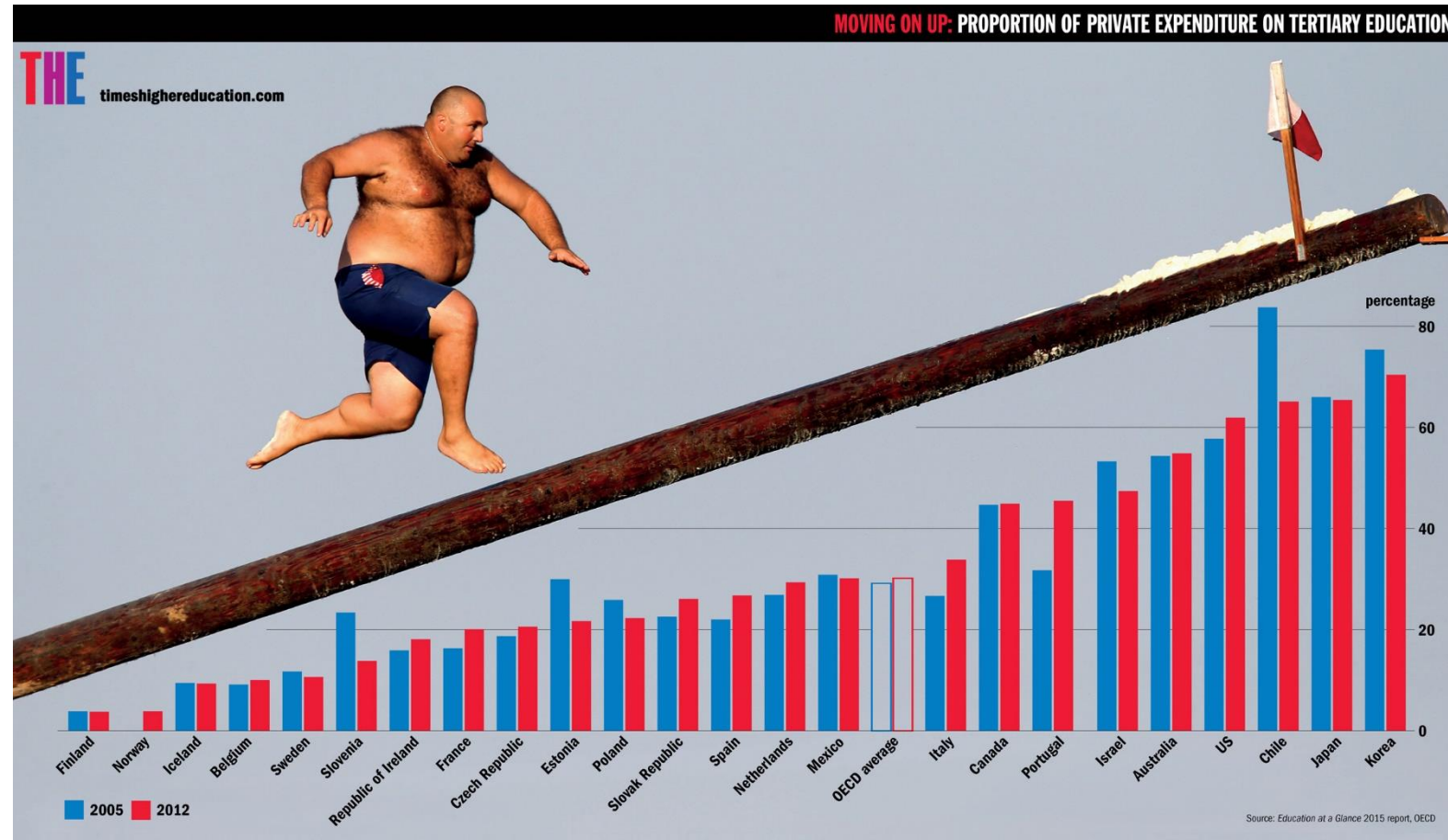
## The 11 most expensive countries for a university education

Percentage of salary spent on university tuition fees



Source: Expert Market; Business Insider

# Mainly privately funded tertiary education



# Education could lead to better health and skills through several mechanisms

- **Lifestyle:** Health behaviour
- **Information and cognitive skills:** General skills, critical thinking, decision-making
- **Income and wealth accumulation**
- **Labour market**
- **Rank:** Education confers relative social position in society; theory based on control over life, demands and stress
- **Preferences** that influence health investments: risk aversion, discounting (present discounted value of the future)
- **Social networks**
- **Knowledge and technology available** to prevent or treat disease

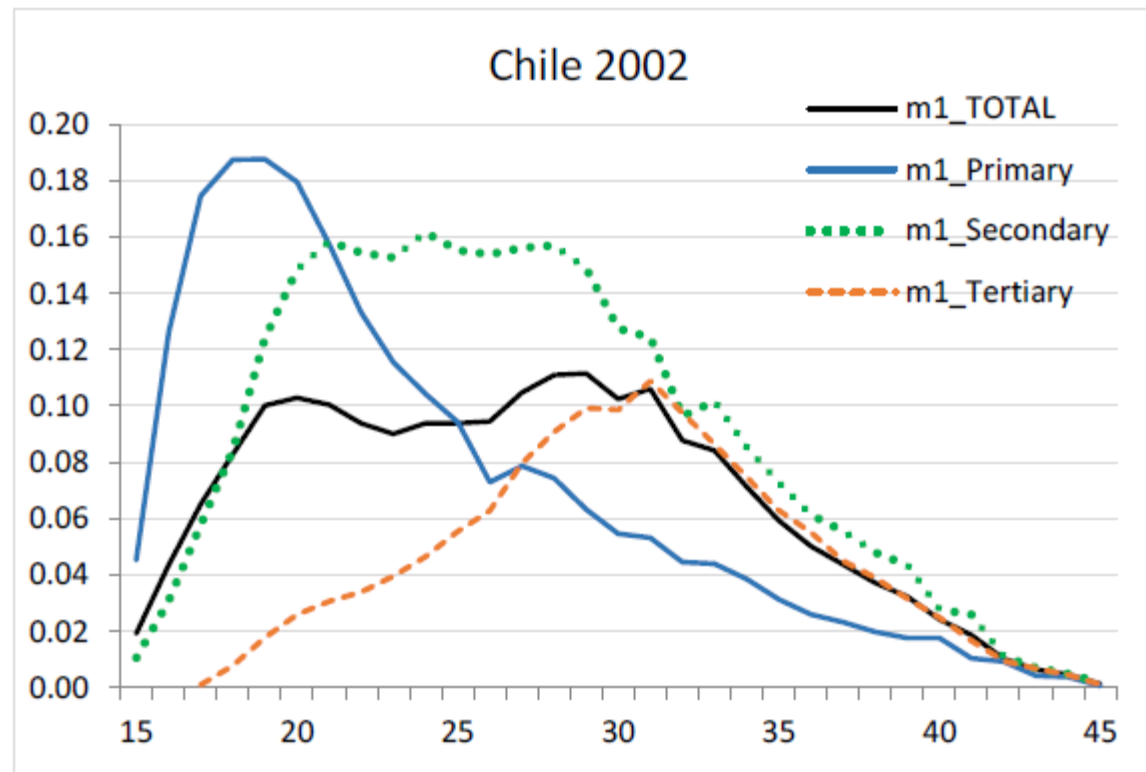
# Fertility

# Fertility



- Childbearing can affect maternal schooling, employment, productivity
- Relative fertility among parents (by skill levels) important
  - strong effect on productivity of next generation
  - intergenerational transmission of abilities and health through shared environment, genetic inheritance and socialisation within families
- Some countries have small education differences in fertility (e.g., Nordic countries) others relatively large (e.g., Italy, Spain)

# Chilean age-specific fertility rates by education



# Adolescent fertility

- In addition to adverse effects on health, school performance, work opportunities; early motherhood leads to intergenerational reproduction of poverty (Rodríguez, 2013).
- Until 1970s, Latin America stood out for its high levels of fertility. Adolescent fertility in the region is still a concern: it is the second highest in the world, after sub-Saharan Africa.
- Approximately 30% of women become mothers before their 20th birthday (MATERNILAC online database).

# Fertility policies

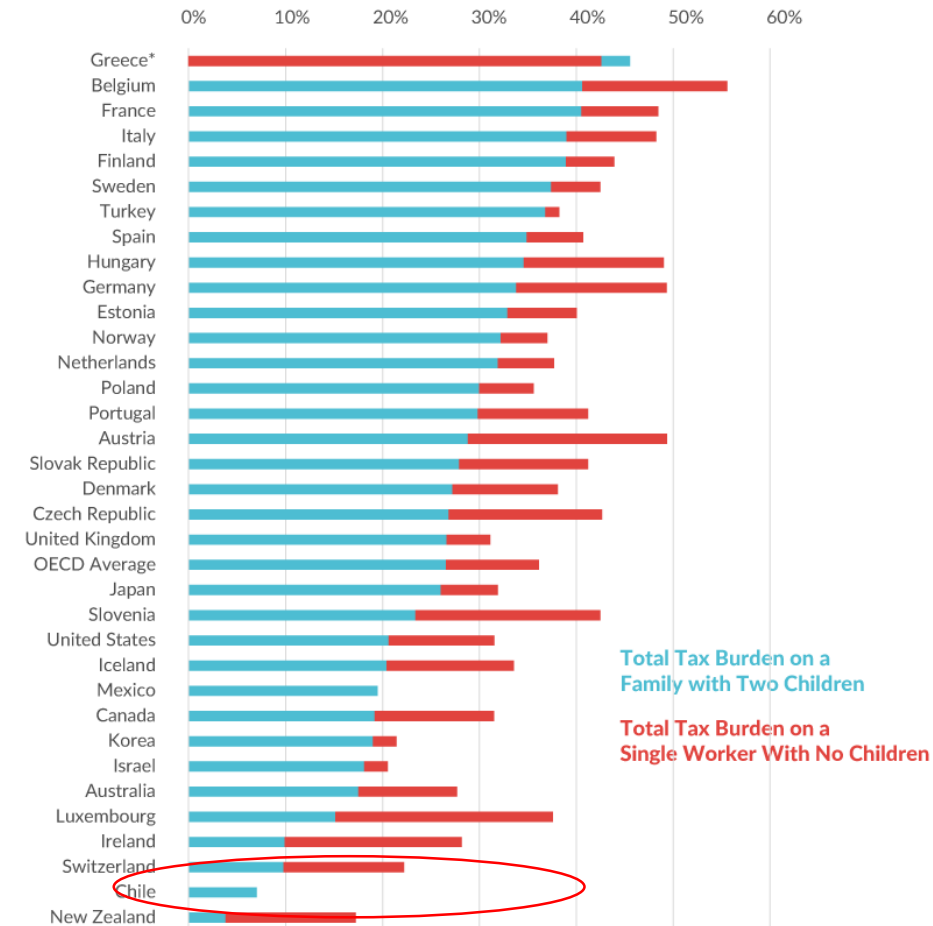
- Reduce quality-quantity tradeoff in fertility
  - High fertility should not translate to lower schooling of children
- “One additional sibling in the family reduces the probability of secondary education by 6 percentage points for girls and 4 percentage points for boys” (Li et al 2017, Demography)
- High fertility also relates to worse cognitive performance (Burhan et al. 2017)
- High fertility in conservative rapidly growing groups, such Israel’s ultra-orthodox and arab populations, related to worsened national test scores (Razin 2017)
- Adolescent motherhood has negative consequences on women’s education and labor outcomes, particularly on women that become mothers early in adolescence (Berthelon and Kruger 2016)

# Tax burden for families



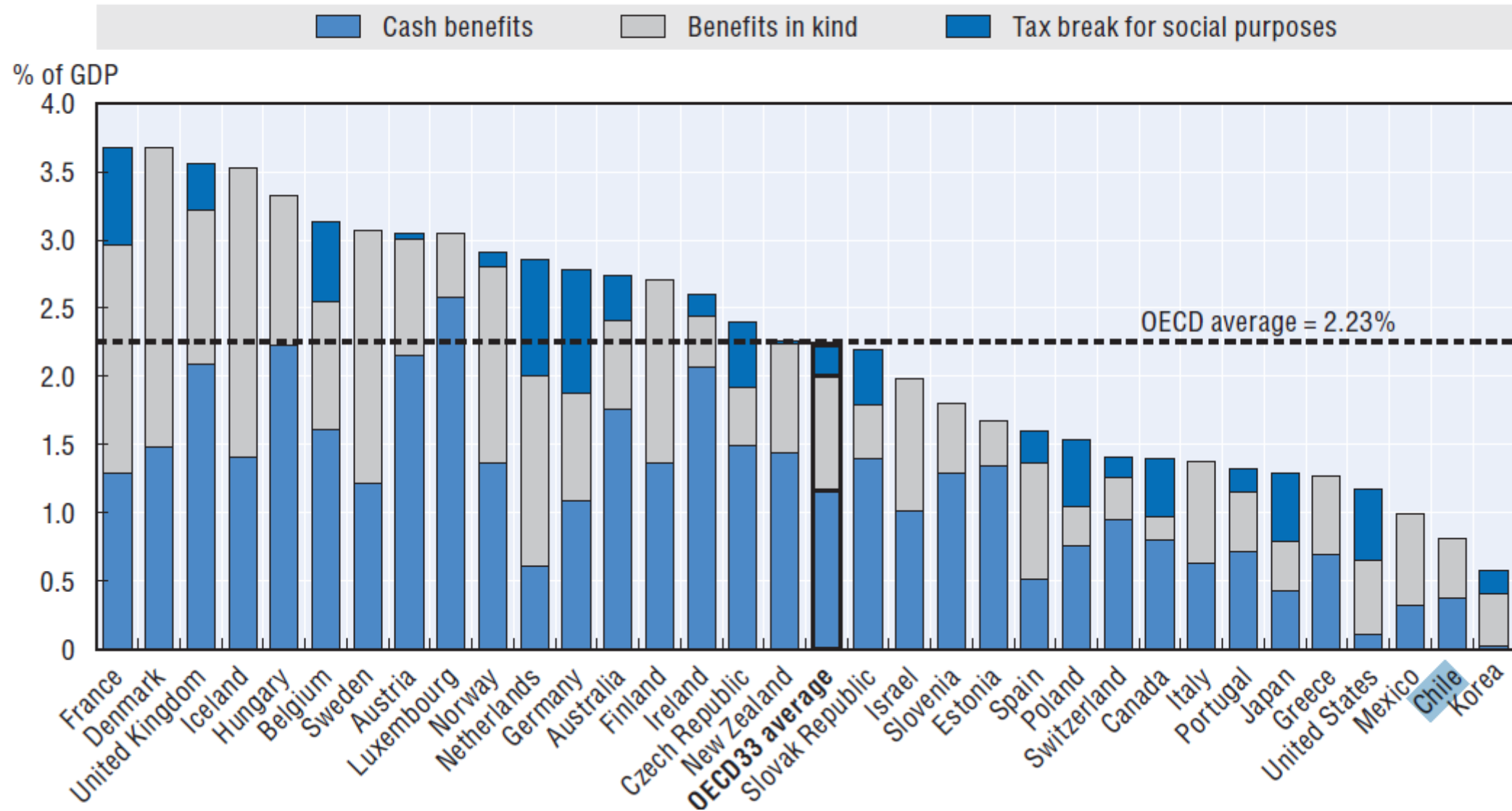
## Most OECD Countries Give Tax Relief to Families with Children

Tax Burden on Workers in the OECD Based on Family Composition, 2014



\*Greece is the only country that places a higher tax burden on families than on single workers with no children.  
Source: OECD Taxing Wages, 2015.

Figure 1.11. Public spending on family benefits in cash,<sup>1</sup> services<sup>2</sup> and tax measures, in percentage of GDP, 2007



Policies to uphold skills and maintain social equity during economic downturns

# Stronger policies to minimize human capital accumulation during any economic recessions

- Governments and insurance providers may provide better solutions to offset any direct effect of economic shocks on individual health and skill acquisition.
- Examples include
  - child health in Colombia (Miller and Urdinola 2007)
  - human capital accumulation in Peru (Schady 2004)

# Business cycles and fertility

- Fertility and economic fluctuations usually positively related (Sobotka, Skirbekk and Philipov 2012) – but less so if government supports families more
- positive association between the business cycle and changes in total fertility in LAC (Adsera and Menendez 2013)

# Employment

# WEF ranking Chile: 51/130 (2016)

- Economic complexity; boost female economic activity; medium-skilled employed share; basic education

25-54

Age Group

Value

Score

Rank

64.60

54

Educational attainment

Primary education attainment rate.....98.60 ..... 98.60.....49

Secondary education attainment rate.....79.43 ..... 79.43.....50

Tertiary education attainment rate.....33.16 ..... 33.16.....10

Workplace learning

Staff training<sup>1</sup>.....4.11 ..... 51.87 .....50

Economic complexity<sup>3</sup>.....-0.360 ..... 44.00.....64

Economic participation

Labour force participation rate.....80.37 ..... 80.37 .....89

Unemployment rate .....5.66 ..... 94.34.....58

Underemployment rate ..... — ..... — ..... —

Employment gender gap .....72.95 ..... 72.95.....83

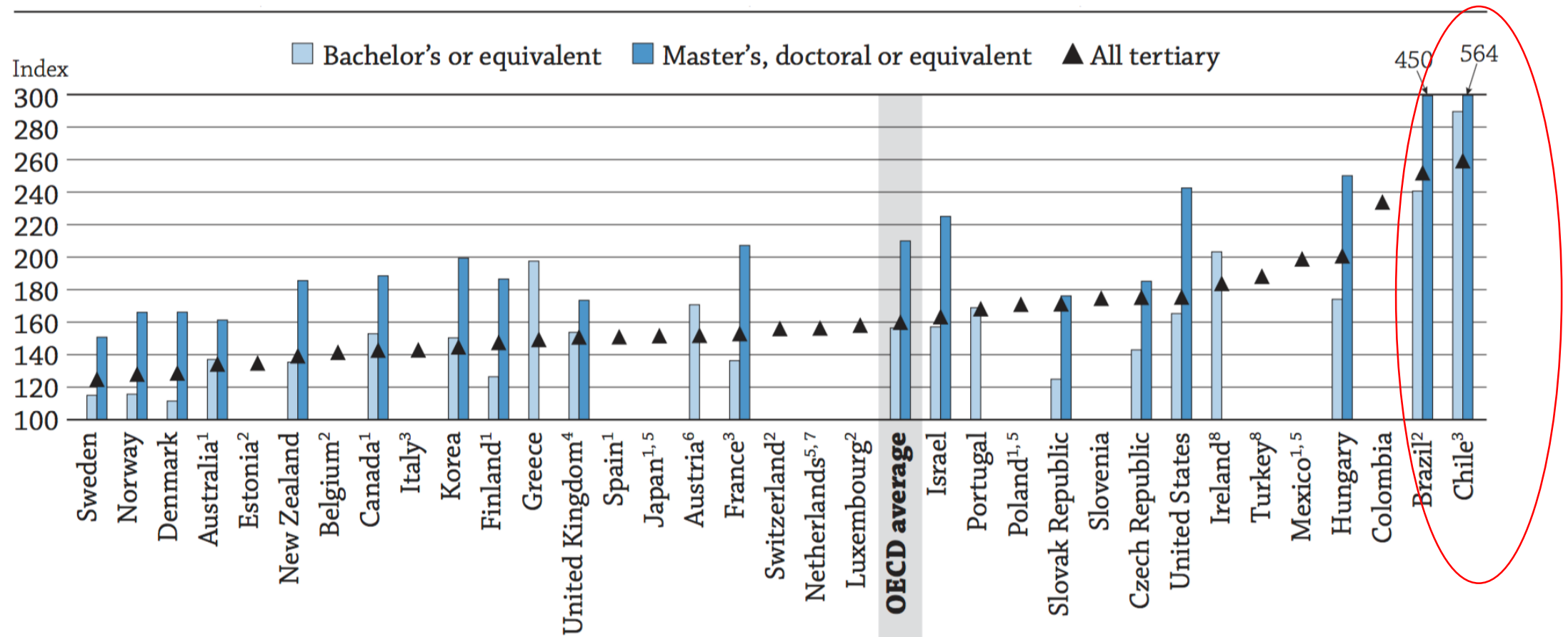
Skills

High-skilled employment share.....25.00 ..... 25.00.....56

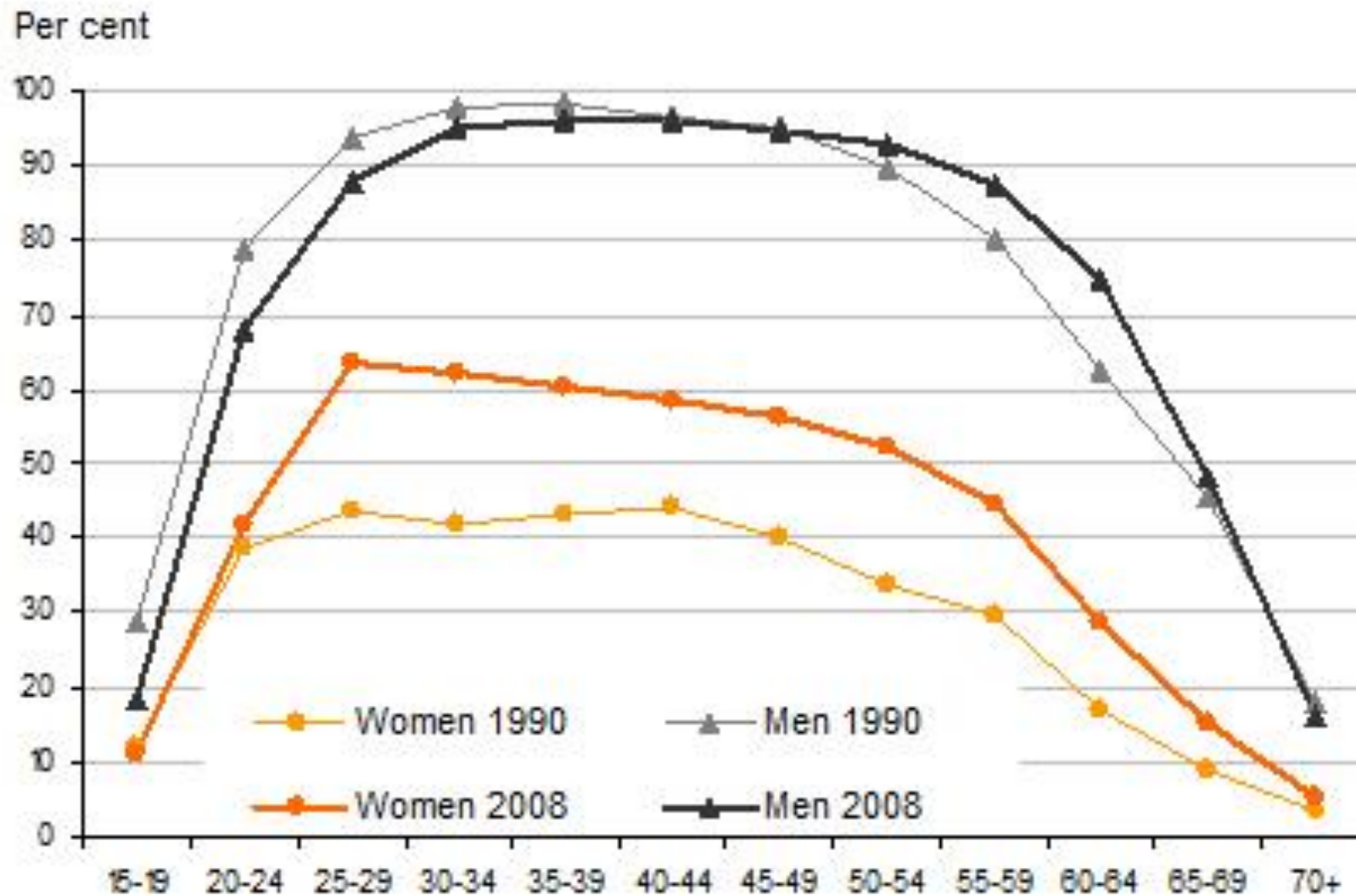
Medium-skilled employment share .....76.50 ..... 76.50.....110

Ease of finding skilled employees<sup>1</sup>.....4.26 ..... 54.38.....48

# Relative earnings of university graduates very high in Chile




# Raise female employment?



# The Puzzle of Why the Status of Women Is Higher in Taiwan than Chile

Evelyn A. Clark, Phyllis Mei-Lien Lu & Cal Clark 

Pages 1-20 | Published online: 11 Mar 2014

 Download citation  <https://doi.org/10.1080/00927678.2014.882164>



 Full Article

 Figures & data

 Citations

 Metrics

 Reprints & Permissions

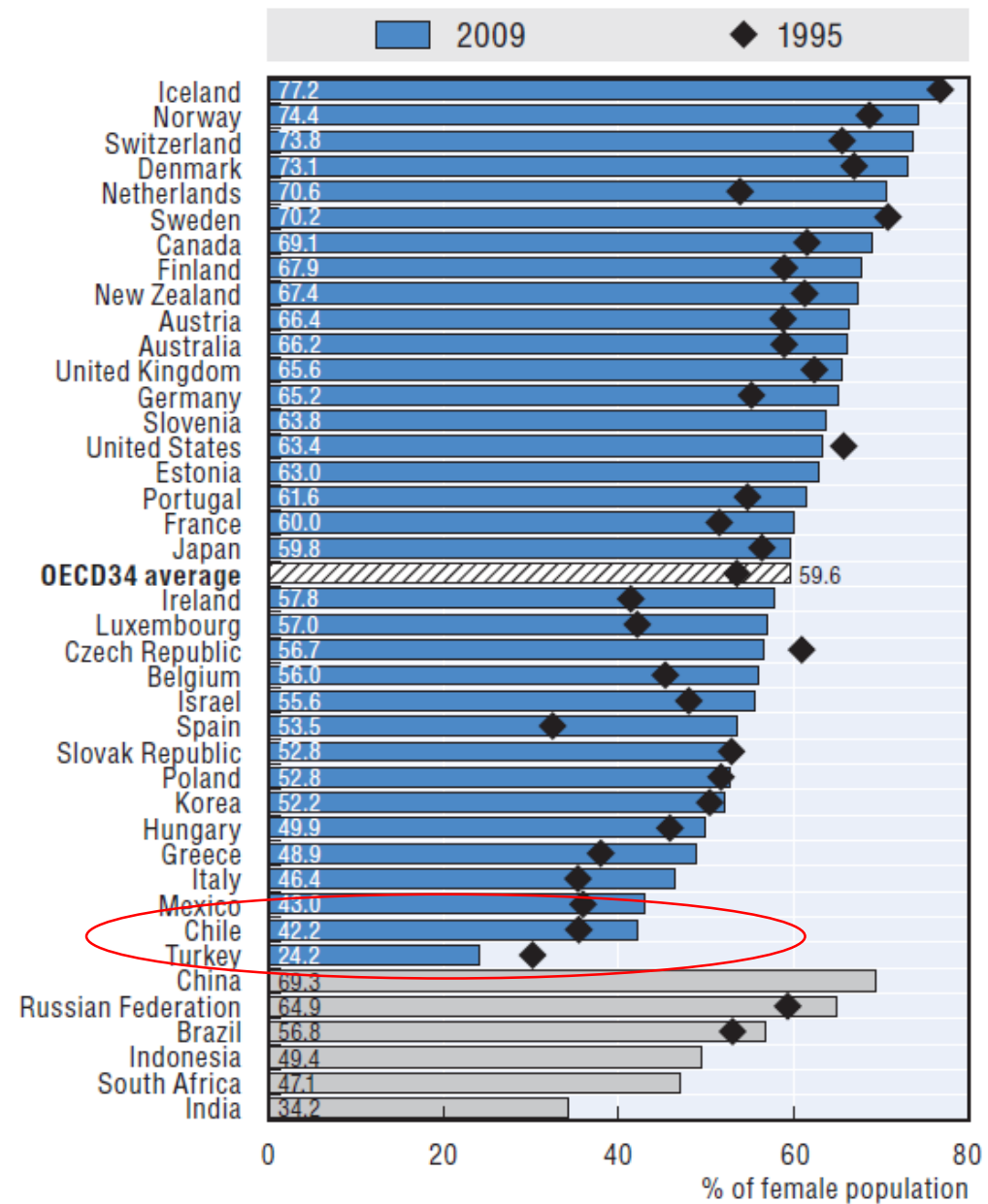
Get access

## Abstract

This paper compares the status of women in Chile and Taiwan in order to examine two research questions: First, what can explain Taiwan's considerably better record in enhancing the status of women? Second, what are the implications for the ongoing debate among global feminists about the effects of globalization on the status of women? Case studies of the two countries suggest that they are fairly similar in terms of progress on women's education and health, but that Taiwan has a very significant advantage in terms of women's employment status and political representation. Taiwan's better performance in these areas reflects its distinctive development pattern and electoral institutions, while the implications of the case studies for the nature of globalization's effects on the status of women are more complex and nuanced.

**Keywords:** Chile, economic development, globalization, status of women, Taiwan

Panel C. Proportion of women (aged 15-64) in the labour market, 1995 and 2009



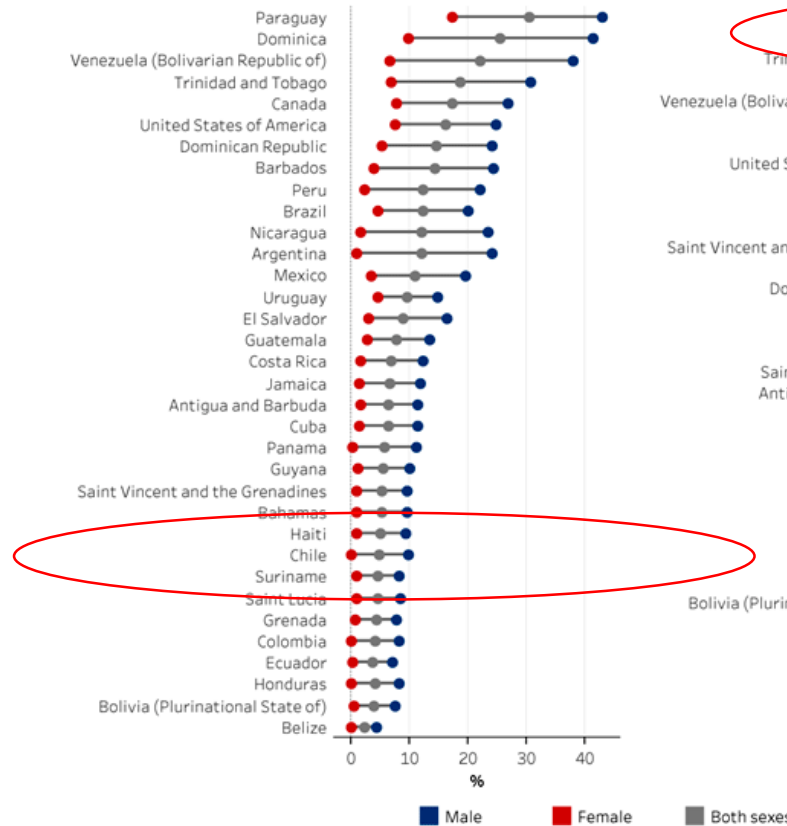
Altering lifestyles to improve productivity



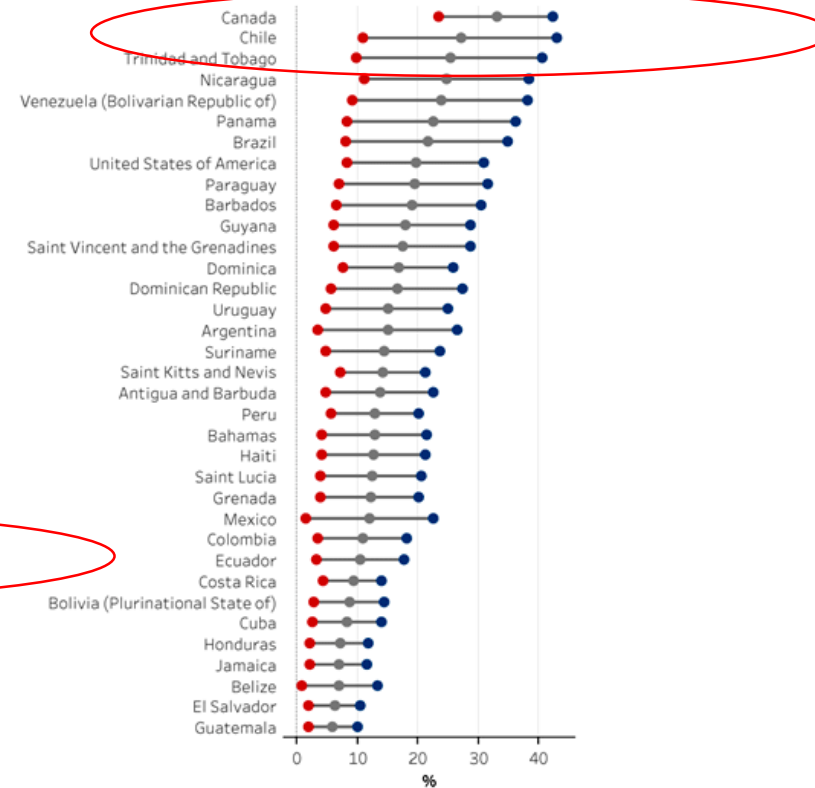
# Chile – excessive drinking among youth



Age-standardized prevalence of heavy episodic drinking among persons aged 15+ years old, 2010

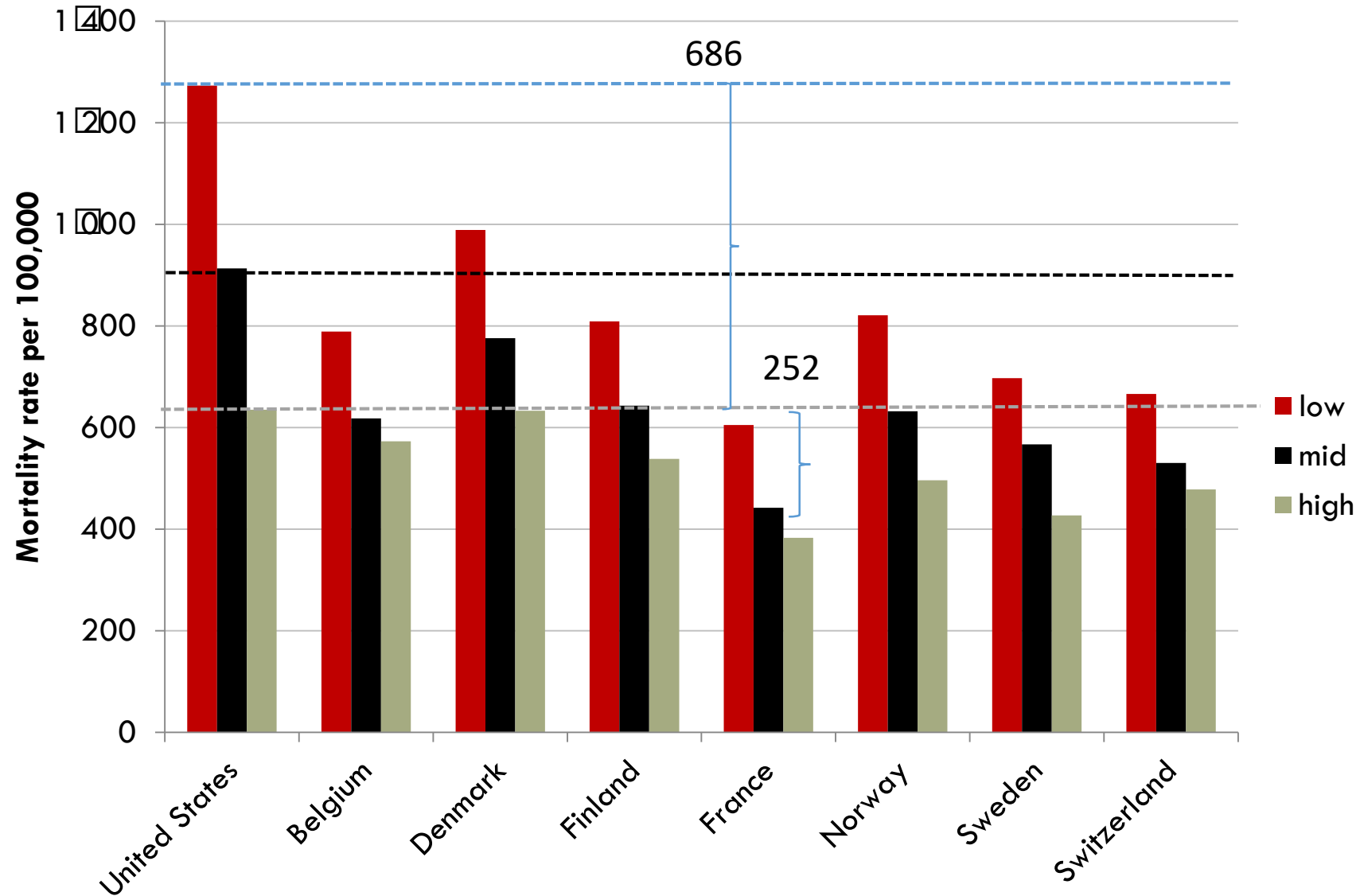


Prevalence of heavy episodic drinking among adolescents aged 15-19 years old, 2010



# Look to Europe? US adults have worse health than Europeans

## Mortality rate per 100,000 by education, women 30-74



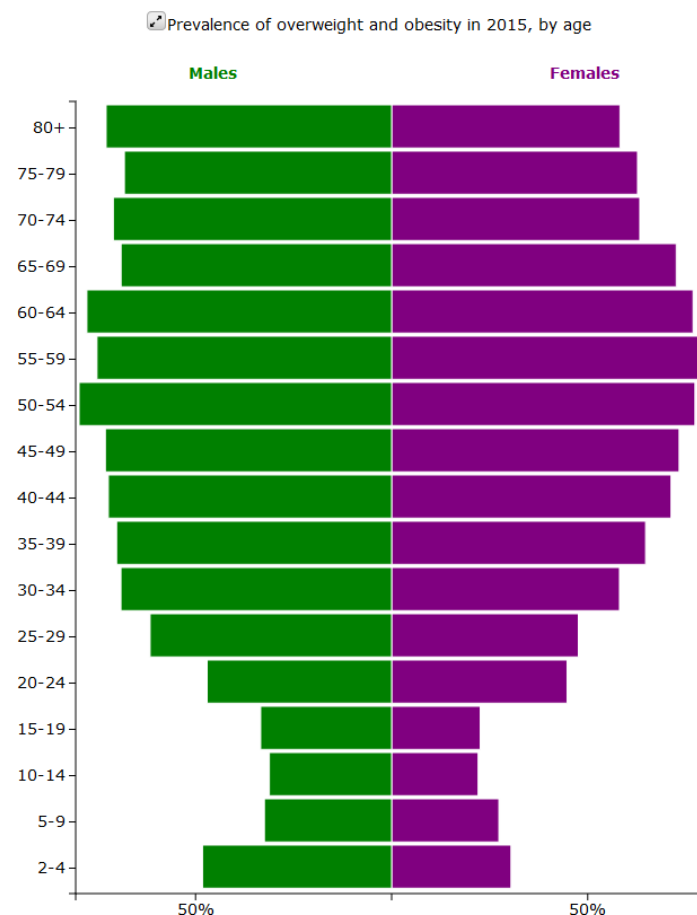
Reducing weight gain



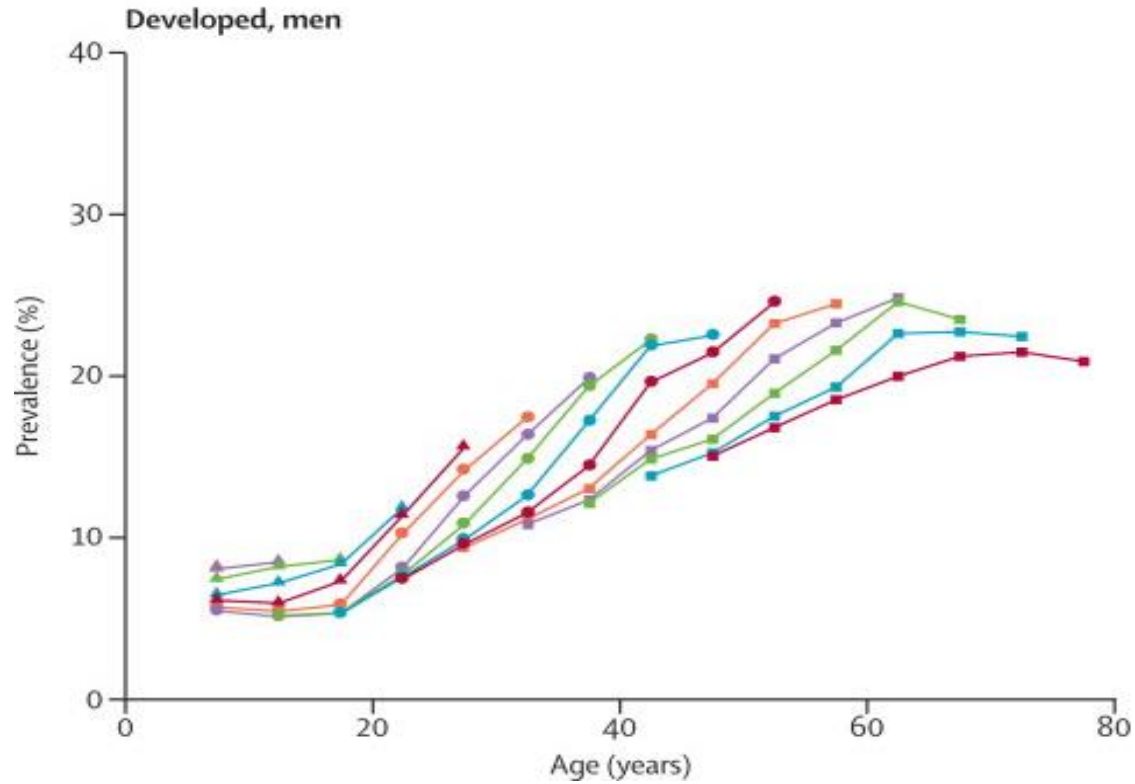
# Overweight/obesity a productivity concern

- High BMI can raise risk of cognitive decline and reduce productivity
  - Could raise the risk of diabetes type II
  - Heighten cerebrovascular and cardiovascular disease risks
  - May limit physical activity
  - Could relate to depression/anxiety
  - Is seldom reversed – preventive measures more effective

# Majority of Chileans overweight/obese



# Major challenge – % obese



## Causes:

- Nutrition, activity levels, sleep
- Genetic makeup, social context
- **Families and education**

Source: Ng et al., 2014

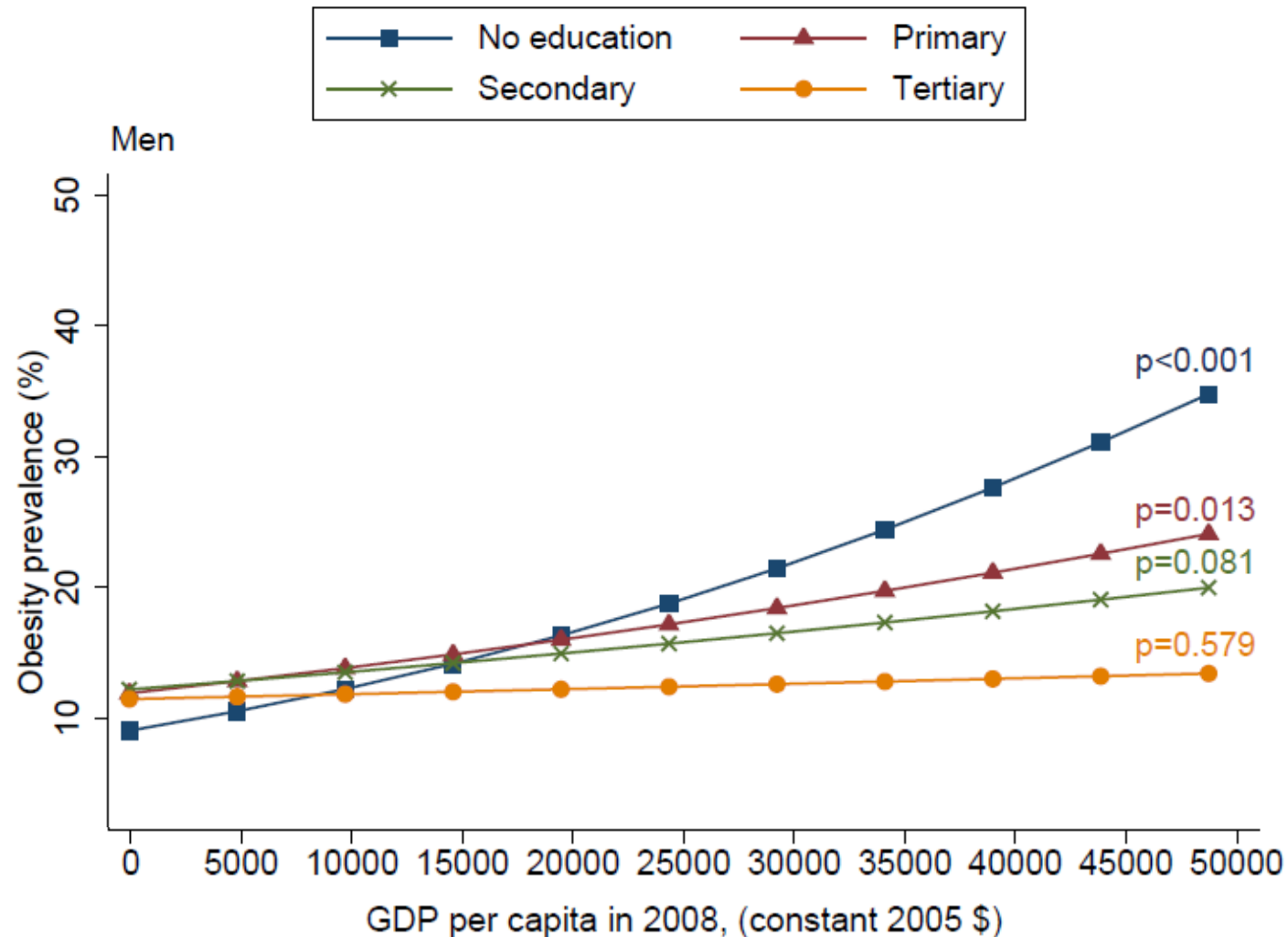
# Measures to cope with obesity - Families

- Beyond the usual interventions related to diets and activities
- Family policies
  - Divorce raises children risk of obesity, especially sons (Biehl et al. 2014) .
  - Fathers may be particularly important for physical activity levels

# Individual vs Social level health determinants

- Shift toward NCDs imply a greater importance of own behaviour and lifestyles – and different aspects of inequality become important
  - Other policies more effective, particularly with respect to changing incentives towards a healthier lifestyle and behaviour
- Individual recommendations may differ from societal recommendations
  - May have to specifically focus on group level factors and communal incentives, e.g., towards risk communities, specific regions with poor health or vulnerable social groups such as those with higher levels of poverty.
- Cultural/social factors matter
  - Causes of SES inequalities must be seen in context

# Education: No increase in obesity by GDP for those with tertiary education



# In sum



- Technological and labour force change imply fundamental challenges for social equity, health and productivity
- Broad policies are needed, both in terms of education, employment, youth culture and economic diversification, to raises skills and productivity
- Rapid skill growth needed to be able to prepare for technological changes and better social systems to minimize adverse effects



Extra slides

## If copper flops, Chile comes a cropper

*Chile's GDP*

*% change on previous year*

*Copper price*

*\$ per lb*

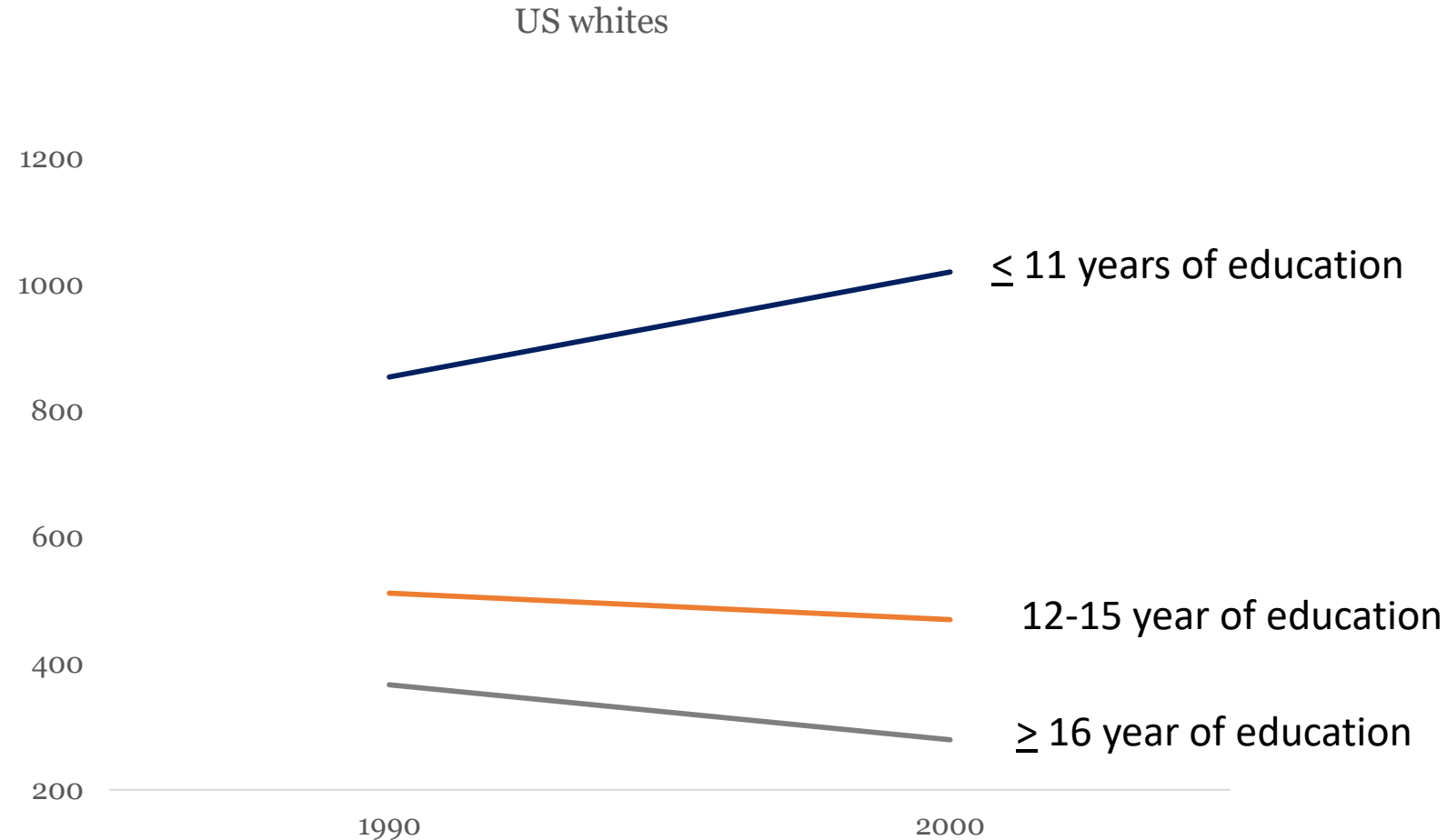


Source: Haver Analytics; JPMorgan

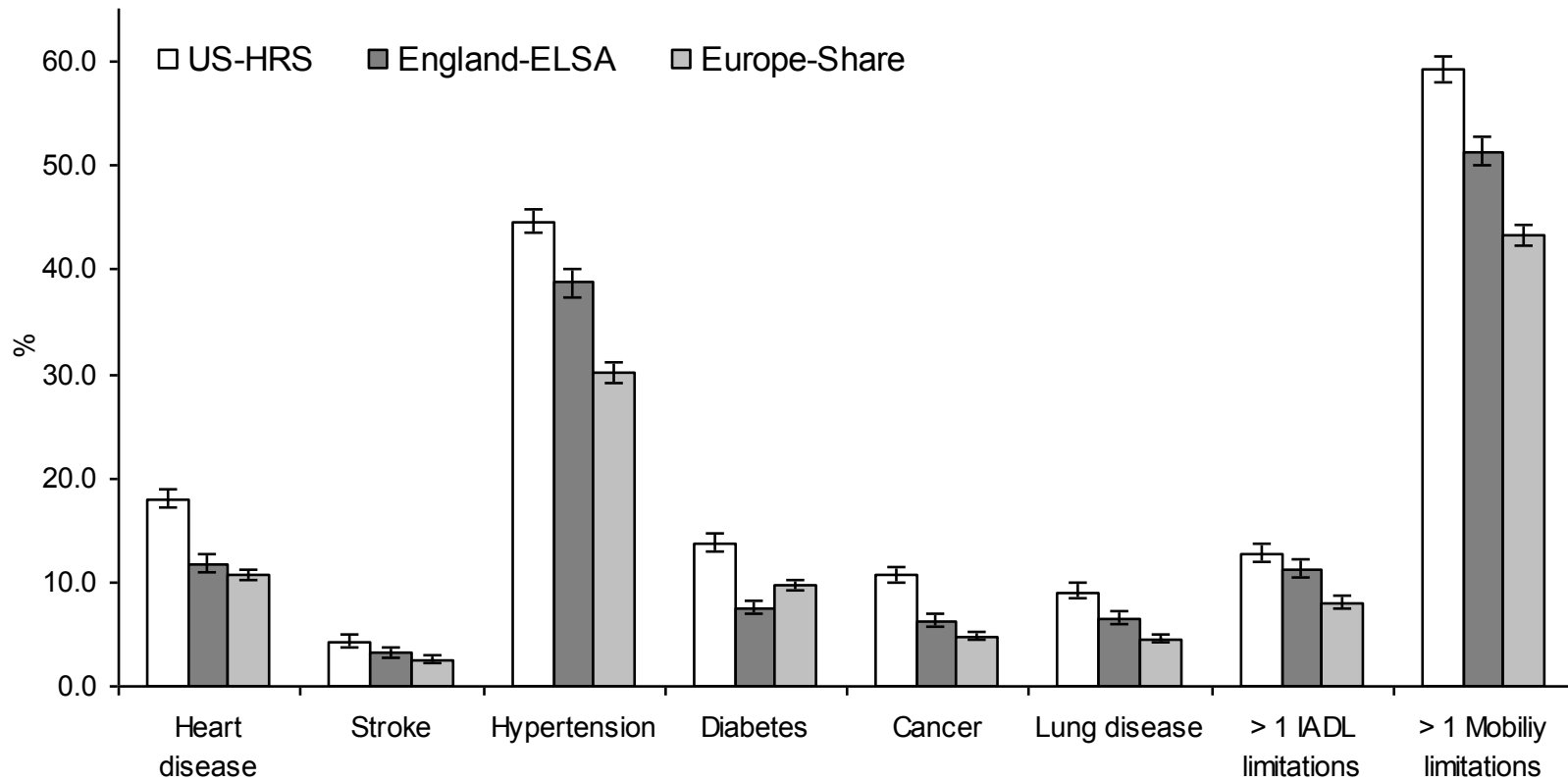
\* Forecast

Graduates (ISCED 5–6)	EU-28	Chile
– in social science, business and law	34.7	29.4
– in health and welfare	15.7	21.2
– in engineering, manufacturing and construction	13.6	14.3
– in humanities and art	10.9	4.2
– in education and training	9.8	15.8
– in science, mathematics and computing	9.2	4.9
– in services	4.5	7.8
– in agriculture and veterinary	1.6	2.4

# Mortality by education, women, United States, 1990's and 2000's

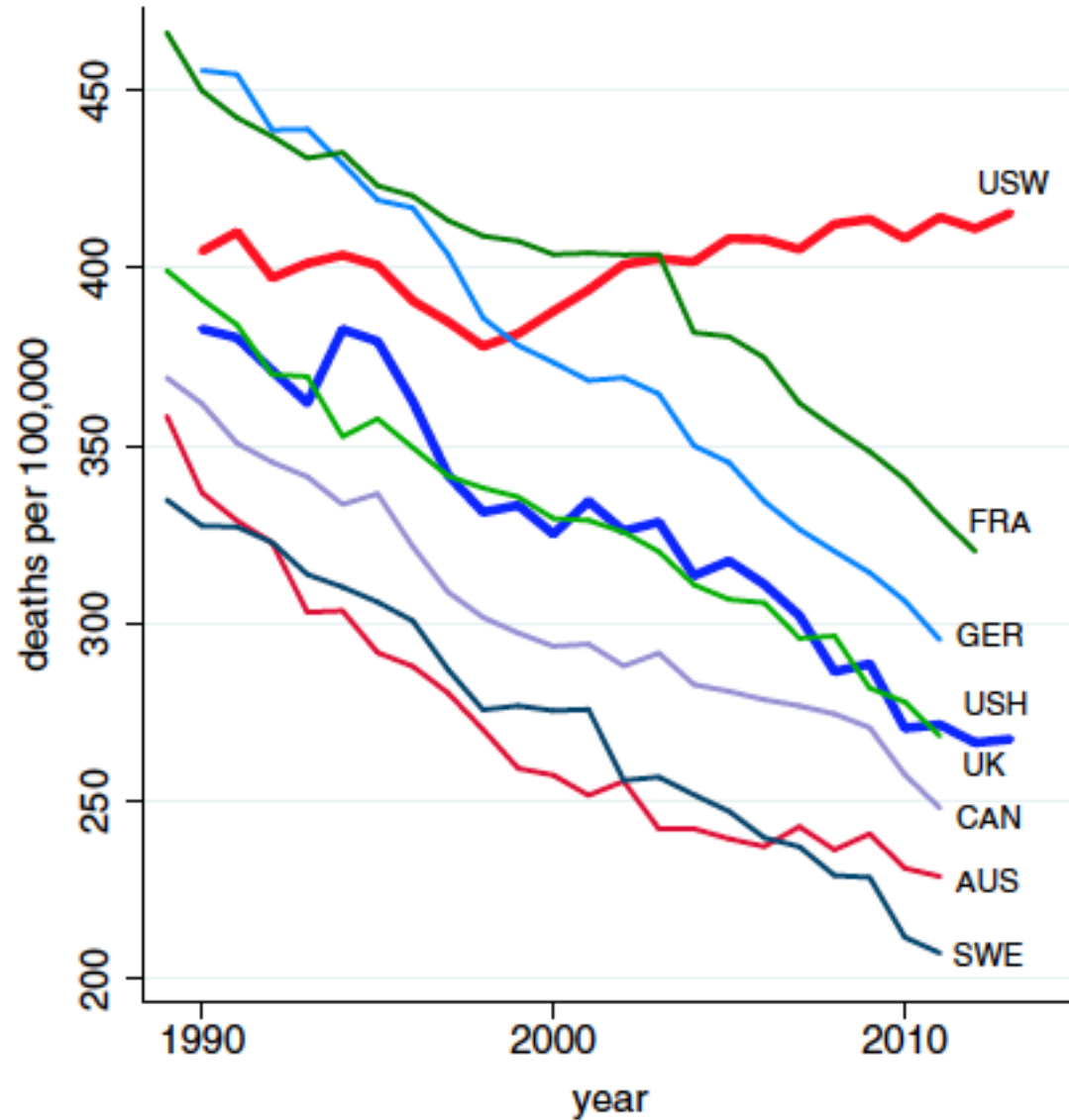


# Look to Europe? US adults have worse health than Europeans



*Prevalence adjusted for age and sex*

# All-cause mortality, ages 45-54, US and six European countries



Case & Deaton, PNAS,  
2015

China

India

