Do lower minimum wages for young workers raise their employment: Evidence from a Danish discontinuity

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PRELIMINARY RESULTS

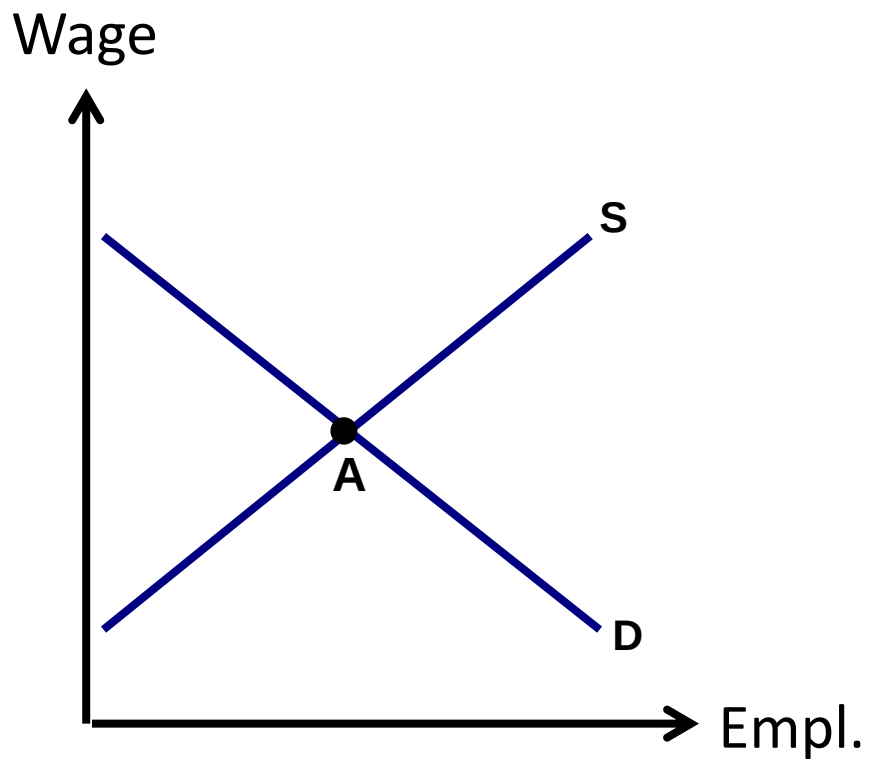
September 2016

Policy debate

US comic on debate about the minimum wage, Spring 2014

Background: Simple theory

Competitive



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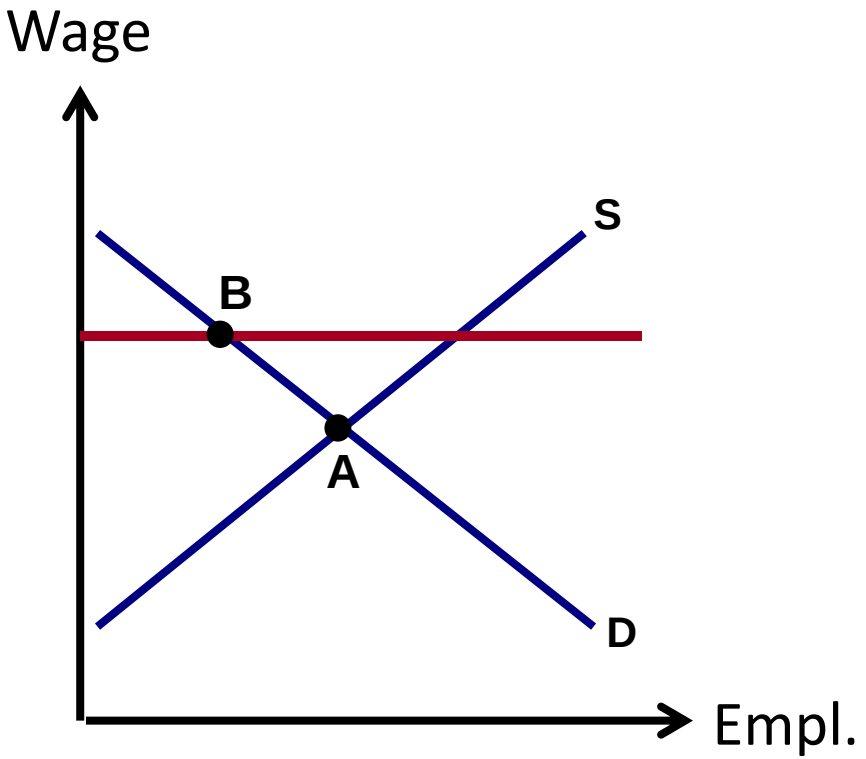
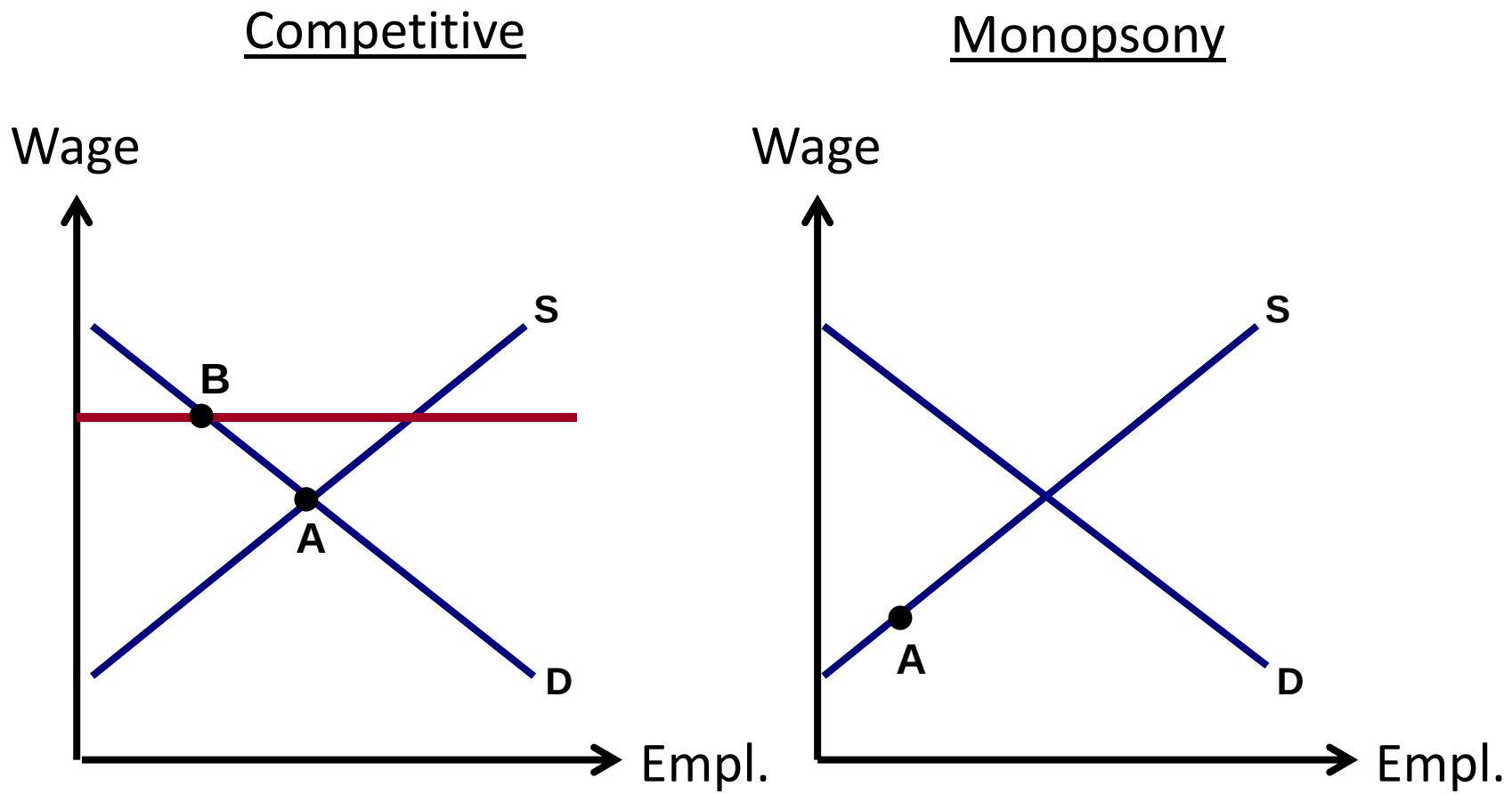


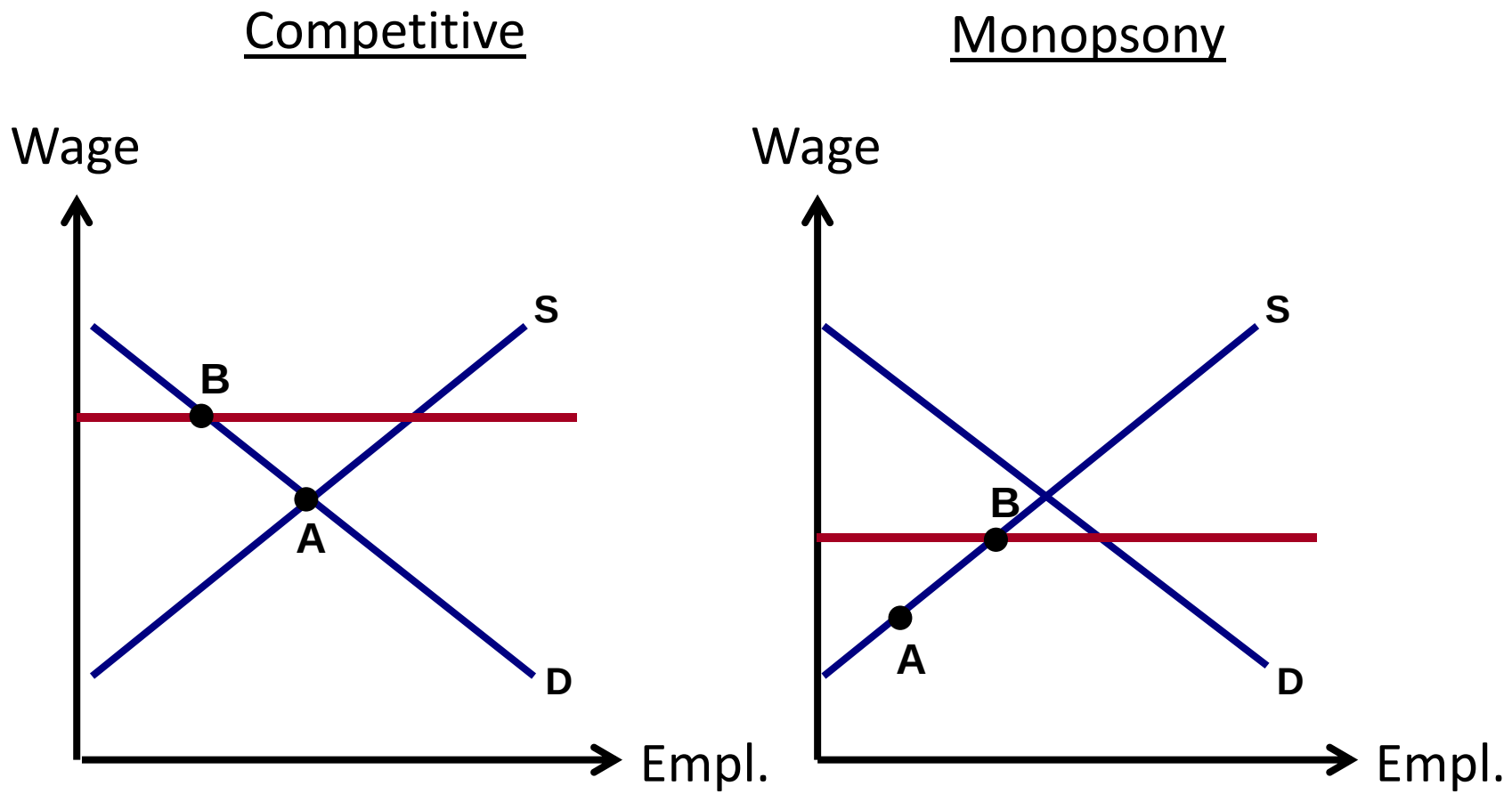
Reduction in employment

Background: Simple theory



Reduction in employment

Background: Simple theory



Reduction in employment

Increase in employment

Background: Empirical evidence

- Card and Krueger (1994) find **no employment effect** of an increase in the minimum wage in the US; most other studies find **small negative effects** (Neumark and Wascher 2008) also on youth employment (Hyslop and Stillman 2007); some studies finding **larger effects** (Baker, Benjamin, Stanger 1999)
- Use policy changes in state/provinces with other state/provinces as control group $\Rightarrow$ **strong common trend assumption + identify only short-run** effects
- CBO estimates that a 10 percent increase in the minimum wage would reduce employment among teenage workers by 0.75%. Computed by setting the **elasticity** of teen employment with respect to a change in the minimum wage of **0.075** after a reading of the empirical literature. CBO Report, February 2014.

Our research agenda and contribution

Main research question

Importance of youth minimum wages for youth employment and income?

Regression discontinuity analysis

Monthly payroll data + **large discontinuity** in minimum wage at **age 18**

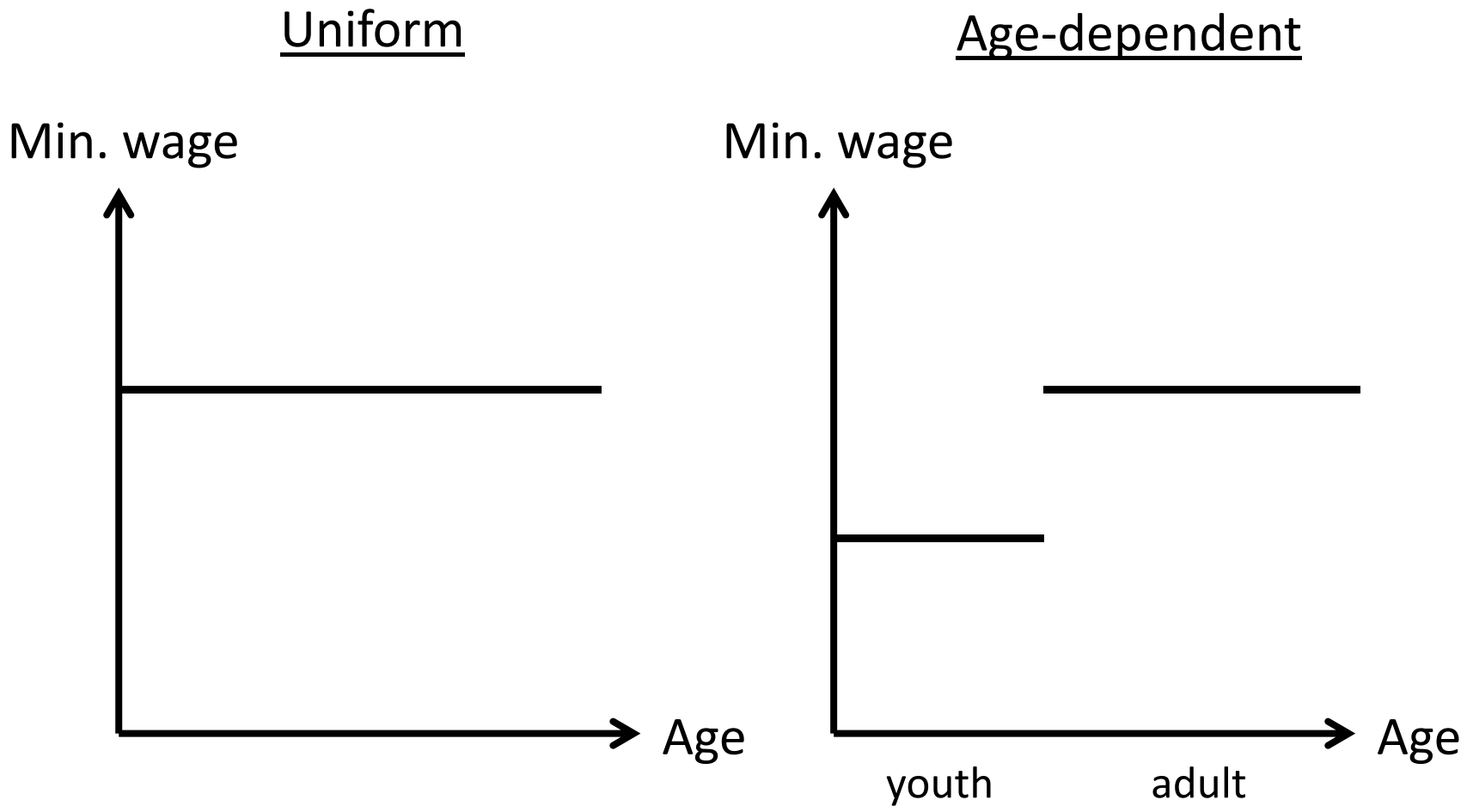
$\Rightarrow$ examine wages, employment, job flows around this discontinuity

Identifies a **long-run effect**, but only a local effect

Labor market theory

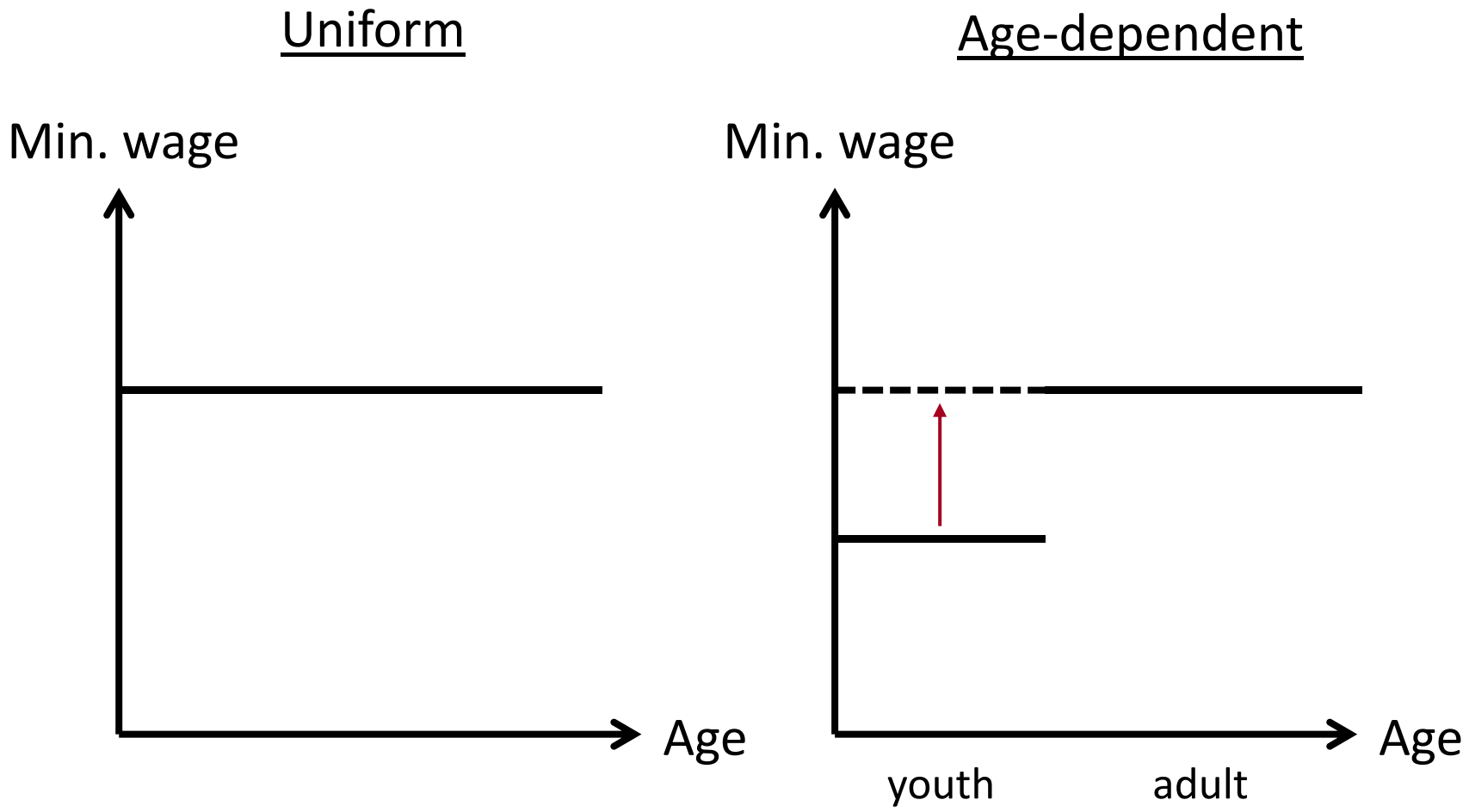
RD result can be used to predict the consequences on youth employment of changes in youth minimum wages

Two types of minimum wage policies



Most US states have uniform min.wage; only exceptions are Illinois and Michigan
Many european countries have age-dependent min.wage, e.g. UK, Netherlands, Denmark

Two types of minimum wage policies



Most US states have uniform min.wage; only exceptions are Illinois and Michigan
Many european countries have age-dependent min.wage, e.g. UK, Netherlands, Denmark

Data and institutional background

E-income register from the Danish tax agency (SKAT)

- **Monthly information** about earnings, employment and hours worked + individual identifier (CPR), firm identifier (CVR)…
- Reported by firms $\Rightarrow$ 3rd party information of earnings $\Rightarrow$ tax of employee $\Rightarrow$ high-quality data

Statistics Denmark registers

- Age, GPA at end of secondary school, parental income…

Sample

- All individuals age 16-19 observed Jan 2008 – Dec 2013 (2015) $\Rightarrow$ 650.000 individuals and 20 mil. observations

Data and institutional background

Minimum wage varies:

- by collective bargaining agreement
- by whether the individual is working overtime
- apprenticeships exempt

Hourly wage rate unobservable in data

We compute average hourly wage rate from monthly information of the employer about earnings and hours worked

- Could be selection bias (employed before vs. after wage hike) and measurement error (due to mis-reporting of hours worked)

Data and institutional background

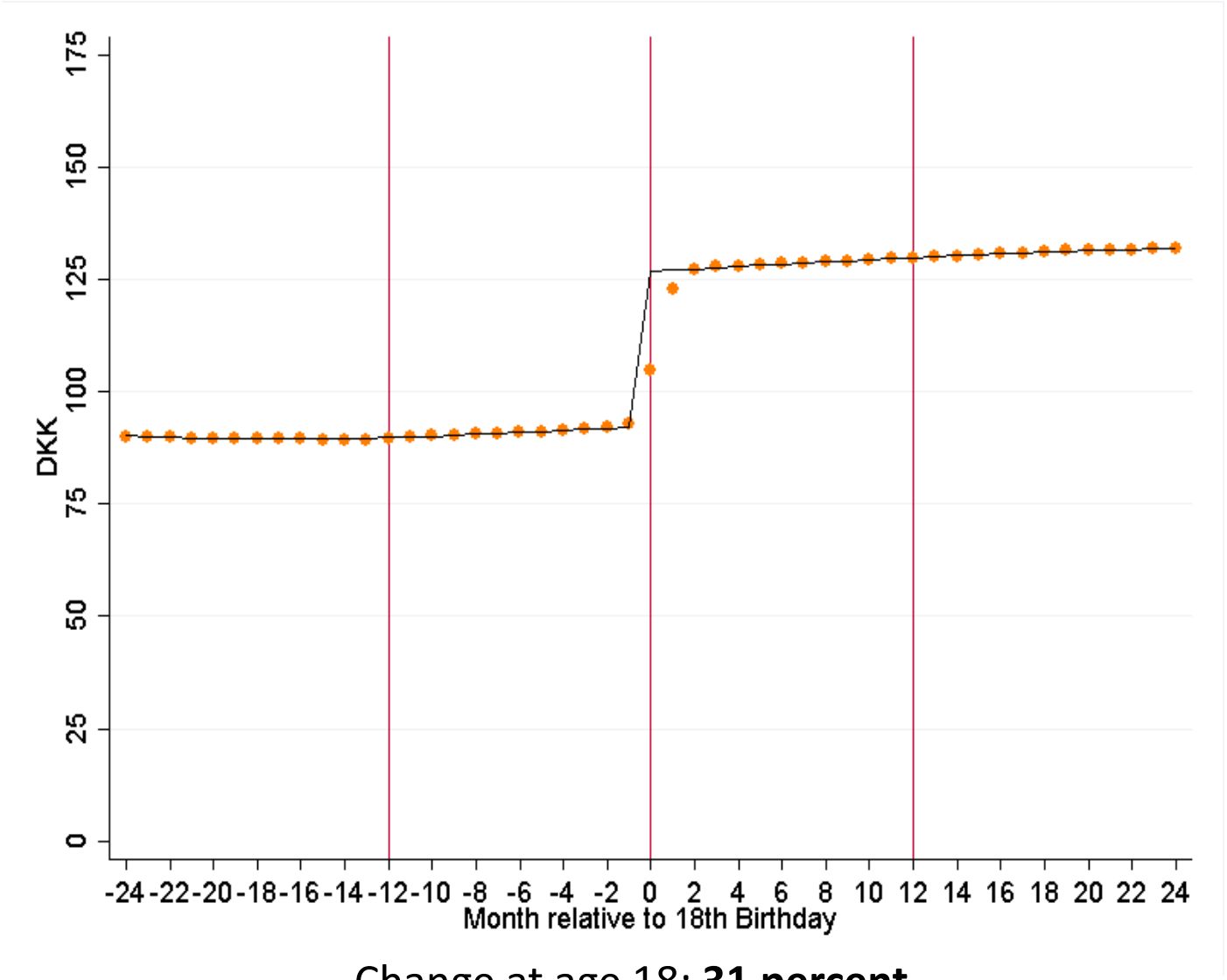
Example: Supermarkets / grocery stores

Around 30% of youth employment

Min. wage rate in collective agreement (”Butiksoverenskomsten”) and actual wage computed from data in 2013 (amounts in DKK, $1 ≈ DKK 6)

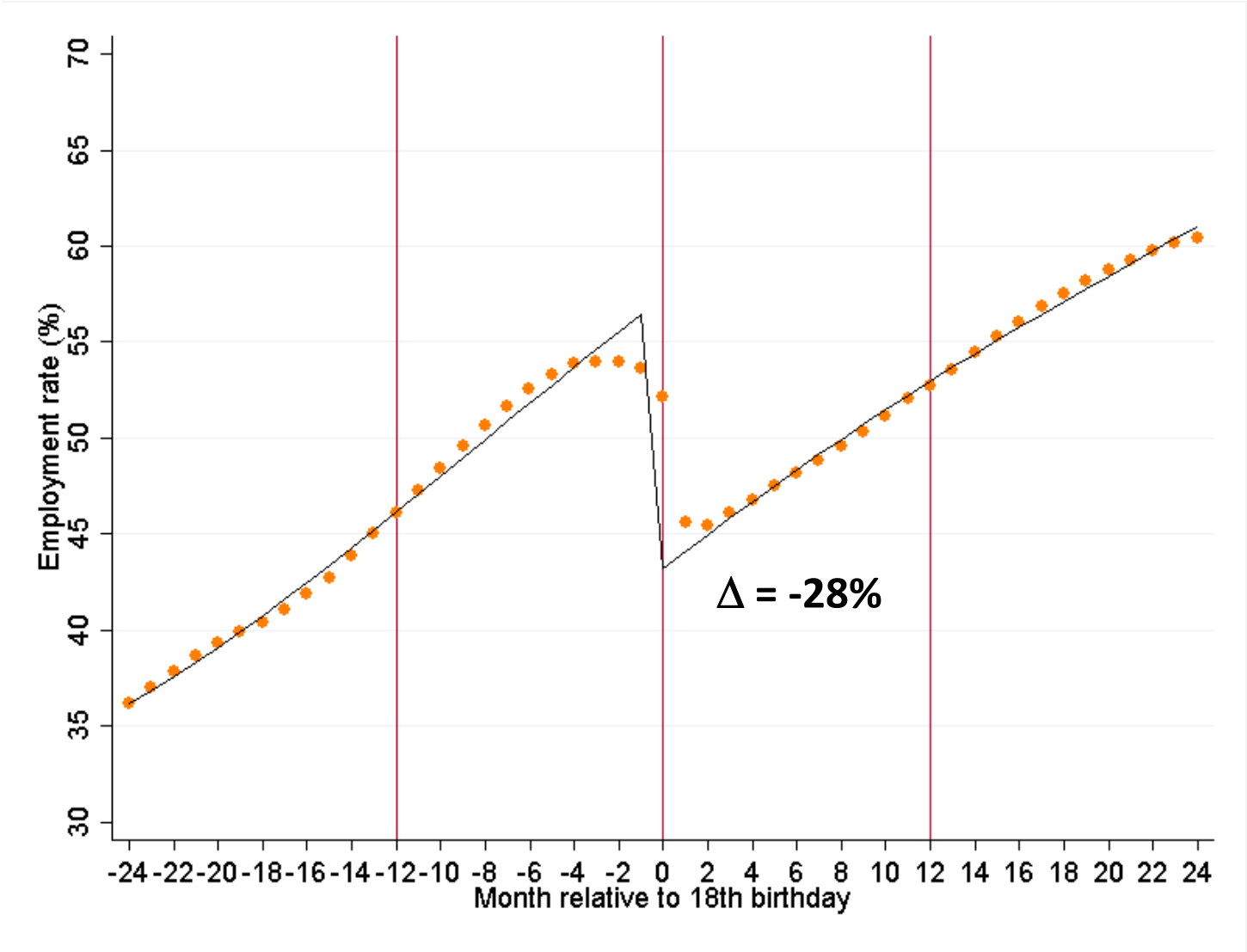
Age:	16	17	18	19
		Collective agreement		
Basic salary:	61	61	107	107
Evening:	73	73	132	132
Overtime:	92-122	92-122	161-215	161-215
Saturday:	82-92	82-92	150-161	150-161
Sunday:	85-122	85-122	156-215	156-215
		Computed from data (monthly earnings/hours)		
Data, mean	81	82	138	137
Data, median	81	82	139	139

Effects of min. wage on employment and income: Hourly wage by age (2008-2013)



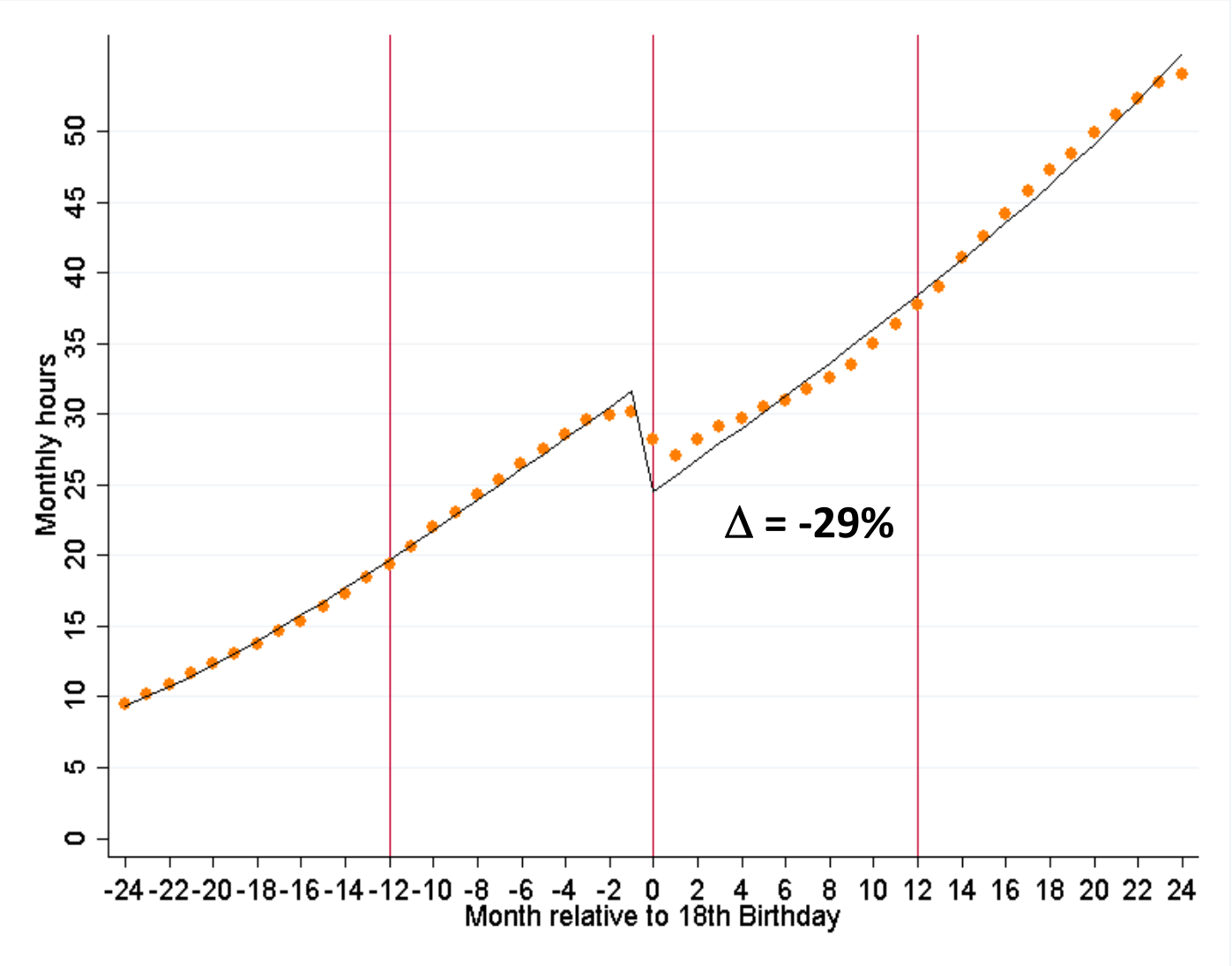
Change at age 18: **31 percent**

Effects of min. wage on employment and income: Employment rate by age (2008-2013)



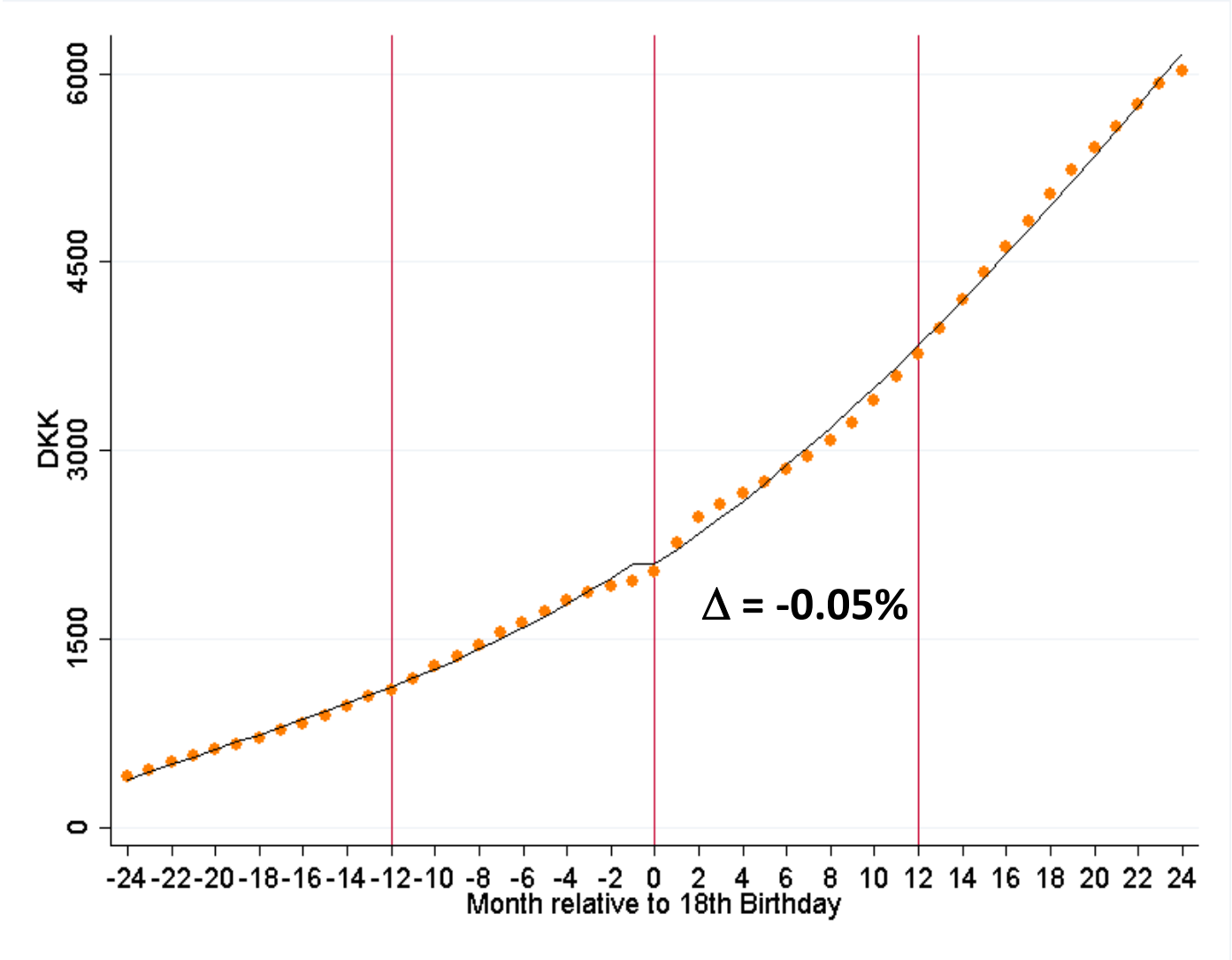
Elasticity of **employed individuals** wrt. hourly wage rate ≈ 28%/31% ≈ **0.90**

Effects of min. wage on employment and income: Average monthly hours by age (2008-2013)



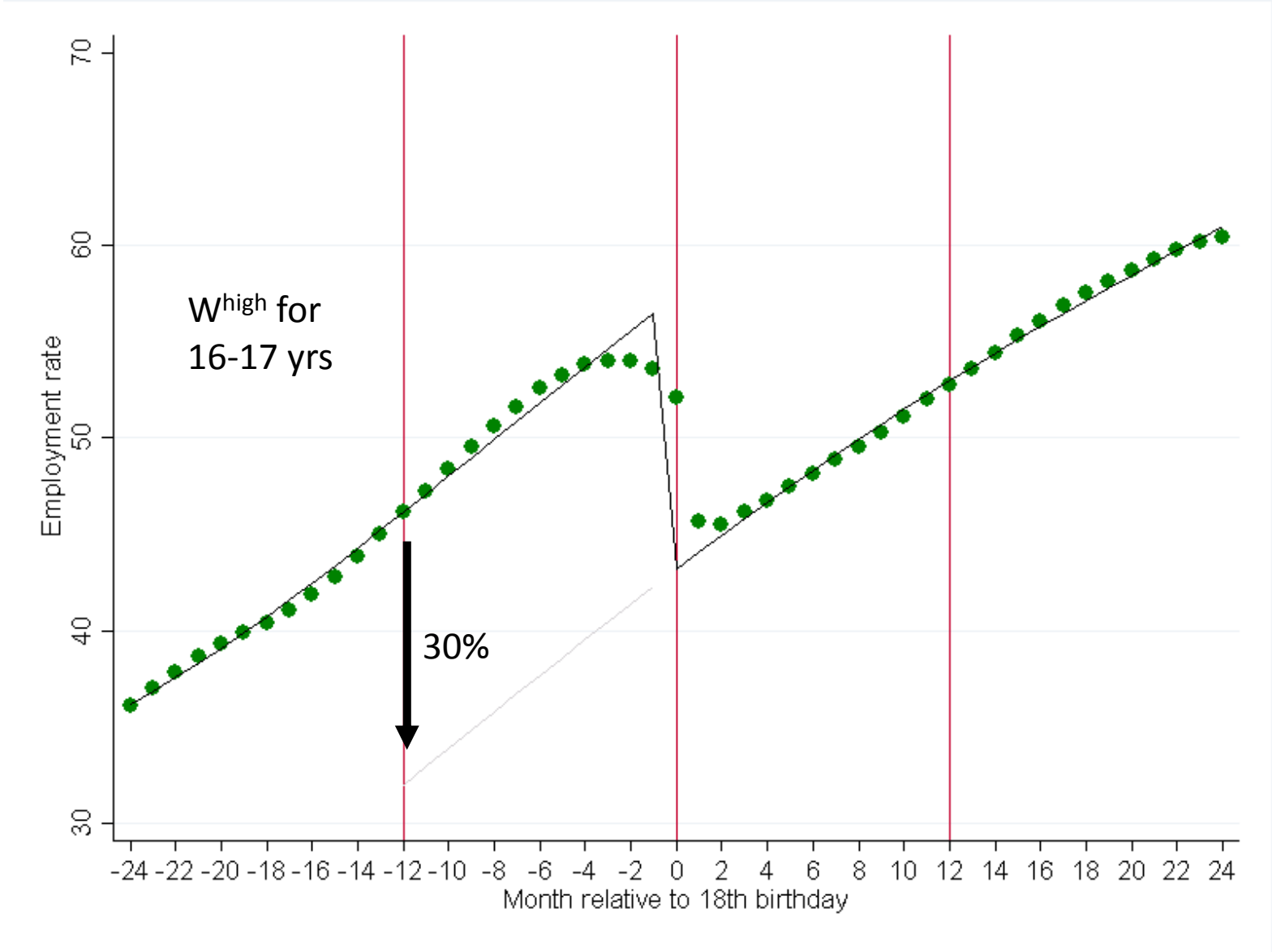
Elasticity of **aggregate hours** wrt. hourly wage rate ≈ 29%/31% ≈ **0.94**

Effects of min. wage on employment and income: Average wage income by age (2008-2013)



Percentage change in average income = $1 - \varepsilon \Rightarrow \varepsilon \approx$ **1.05** is the **hours** elasticity

Policy implication:
Effect of changing the age at which minimum wage hike occurs



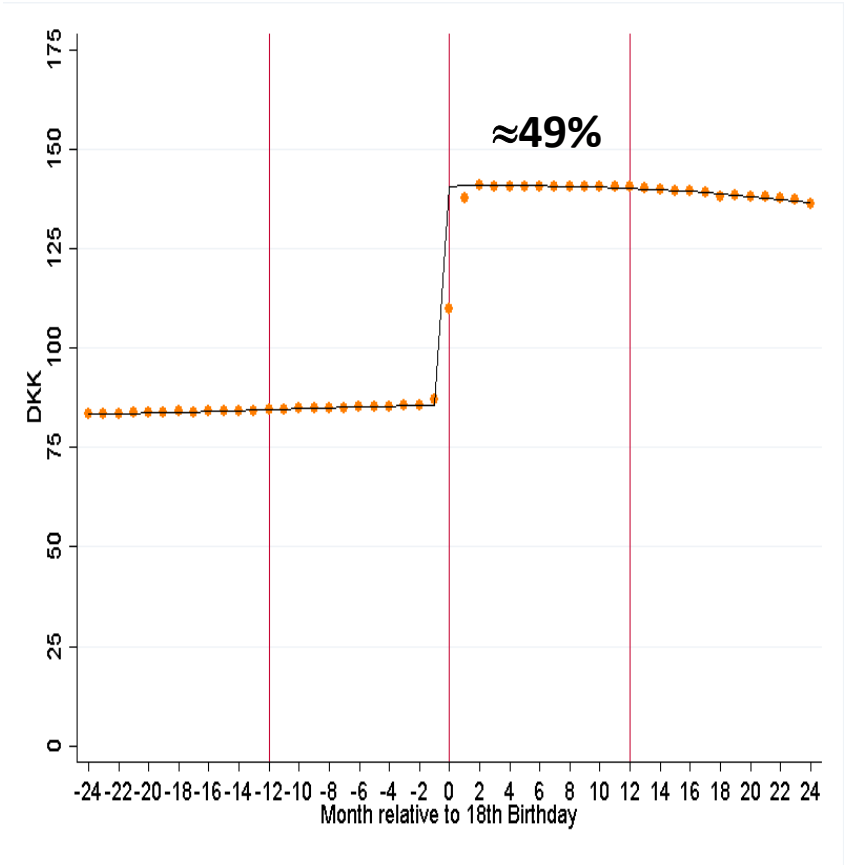
Policy implication:
Effect of changing the age at which minimum wage hike occurs

Policy change: Minimum wage for age<18 raised to the level of ≥18

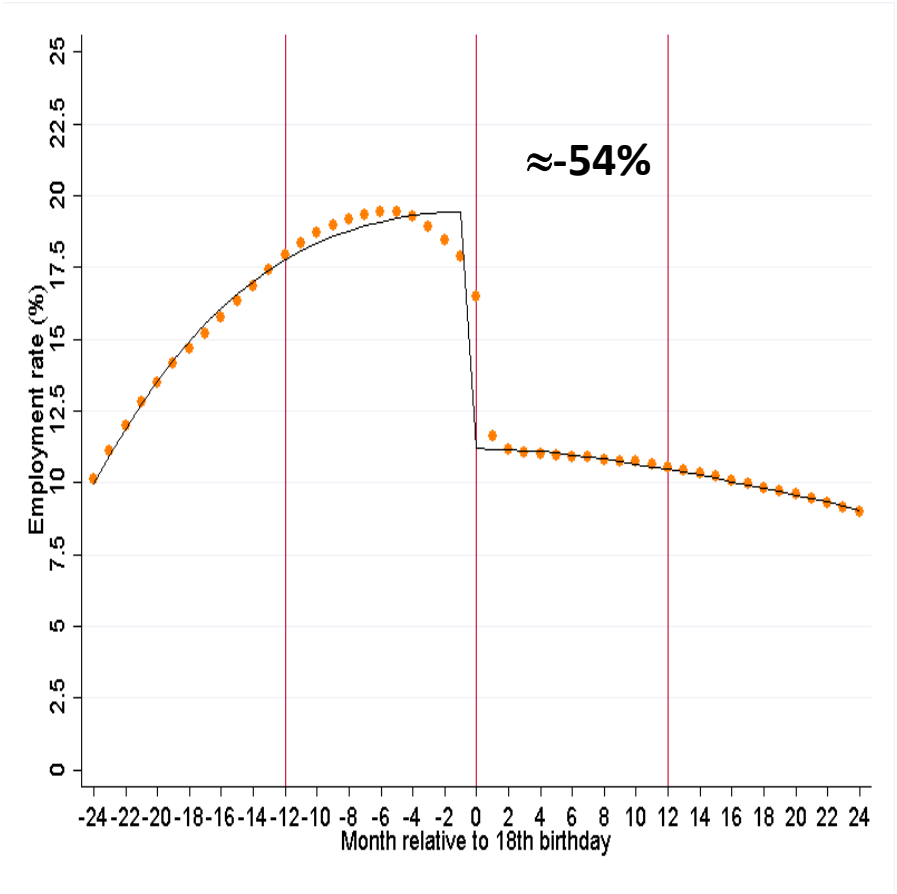
- Underlying theory assumes no change in employment, **age ≥18**, **BUT** cannot be identified empirically
- Search theory ⇒ **decrease** in employment, **age ≥18**
- Decreasing demand for low-skilled labor ⇒ **increase** in employment, **age ≥18**
- **Our estimate** of the employment effect, **age<18** should be a **good approximation** of the actual effect because the share of age<18 in low-skilled labor input is small (<5%)

Effects of min. wage on employment and income: Supermarkets (34%)

Hourly wage



Employment rate

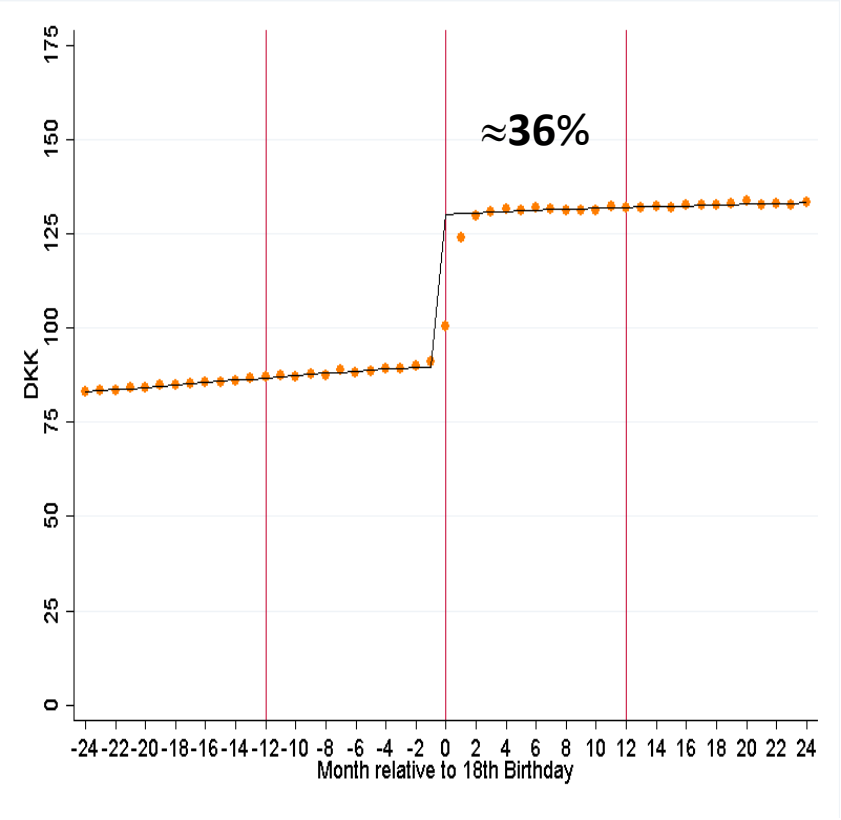


Basic salary in agreement increases by 55% at age 18

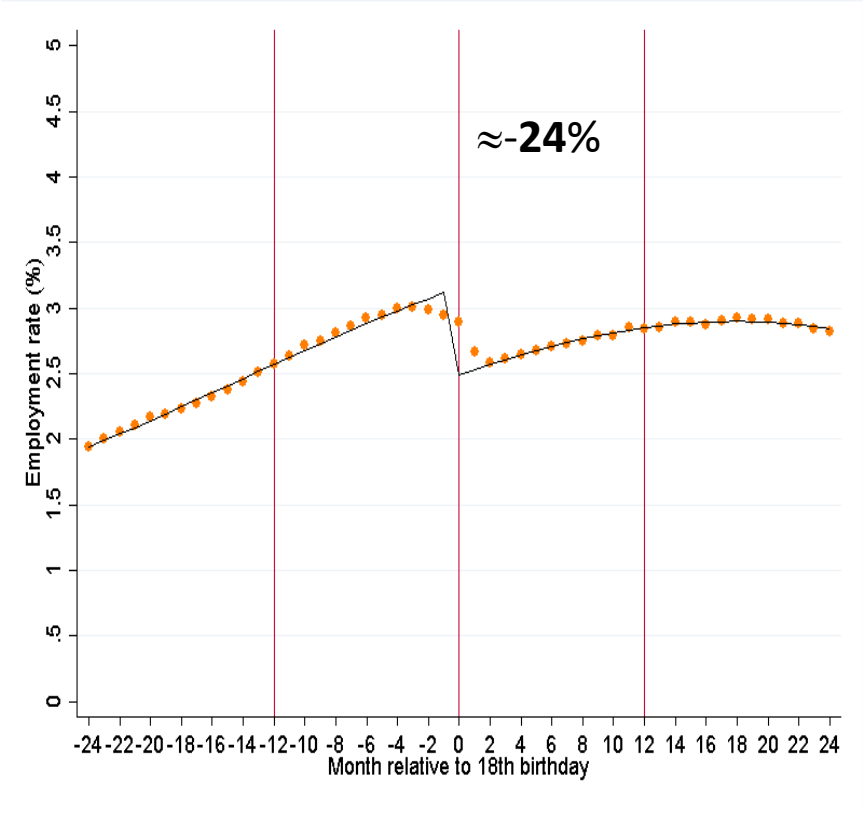
Change in agg. earnings ≈ -23% $\Rightarrow$ elasticity of total hours $\varepsilon \approx$ **1.23**

Effects of min. wage on employment and income: Restaurants (5%)

Hourly wage



Employment rate

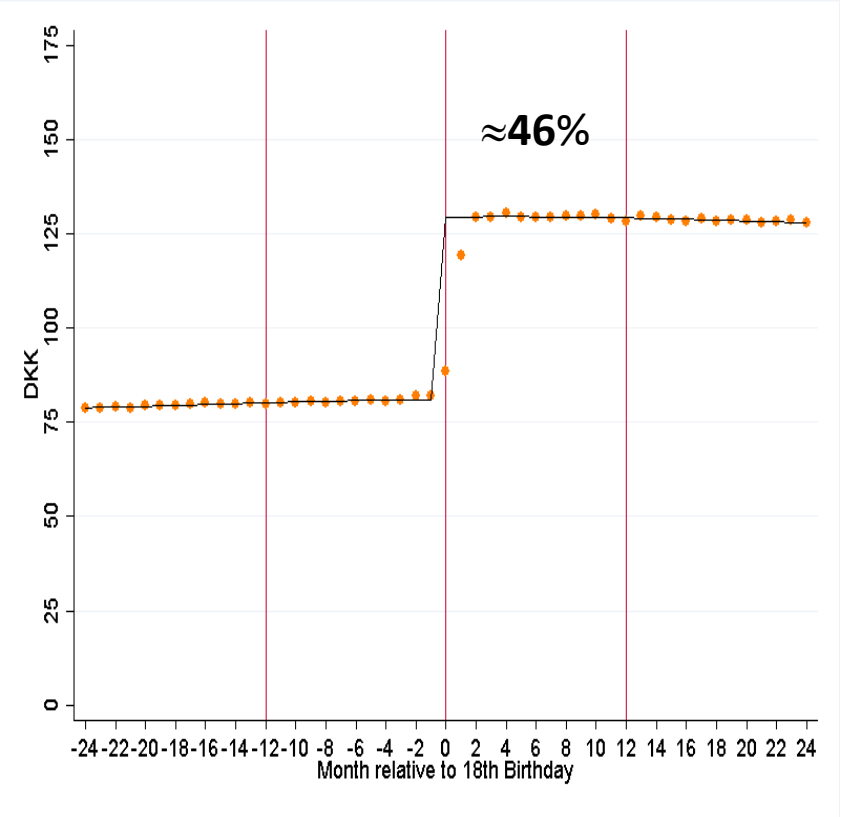


Basic salary in agreement increases by 49% at age 18

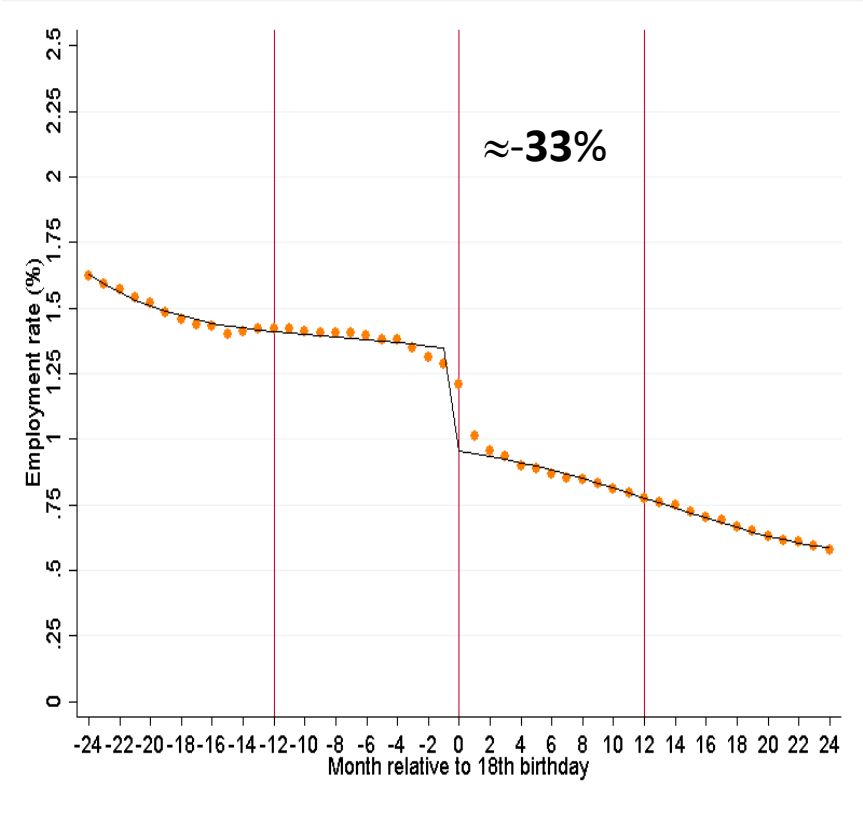
Change in agg. earnings ≈ 3% ⇒ elasticity of total hours $\varepsilon \approx$ **0,97**

Effects of min. wage on employment and income: Bakeries (3%)

Hourly wage



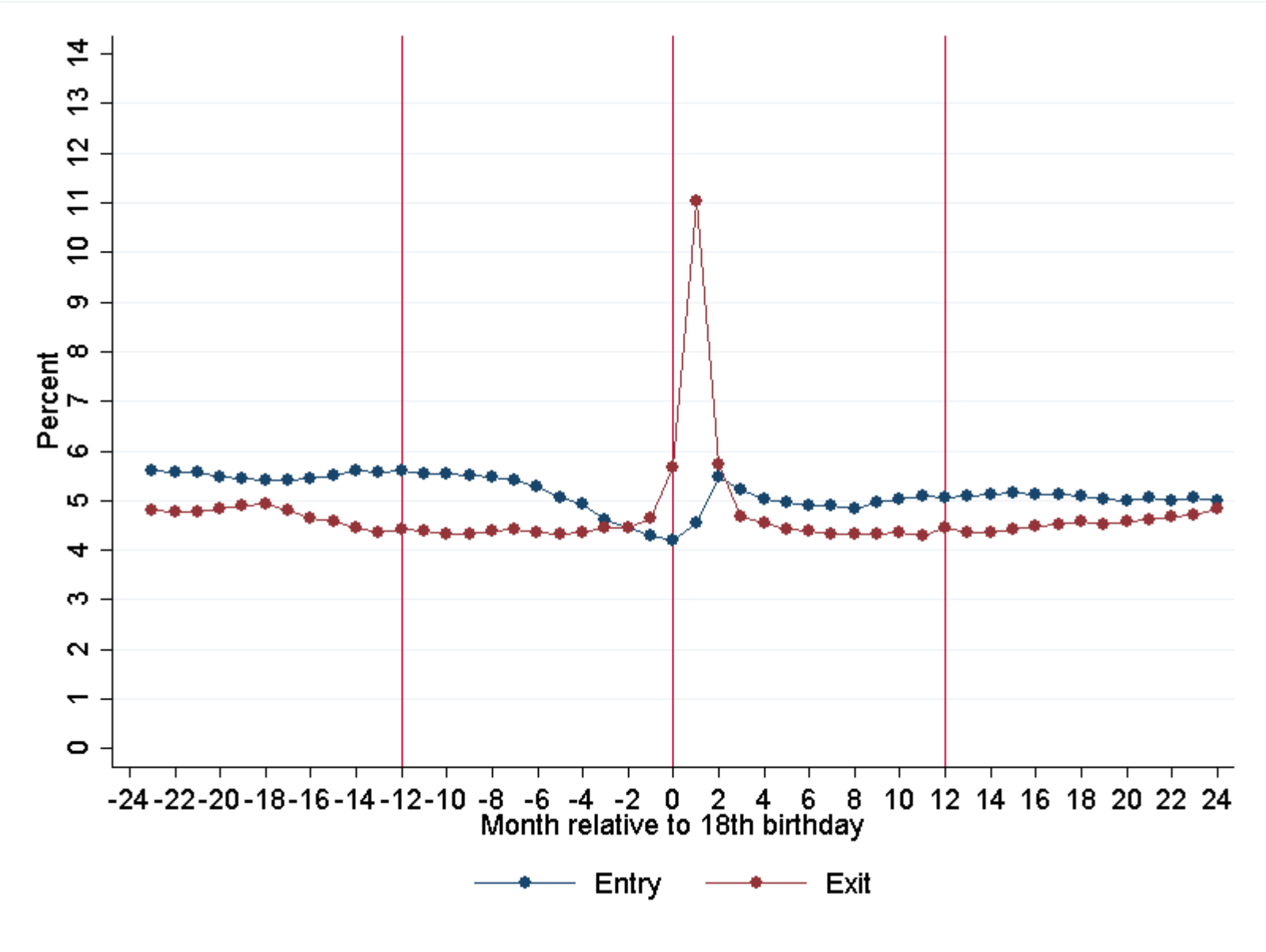
Employment rate



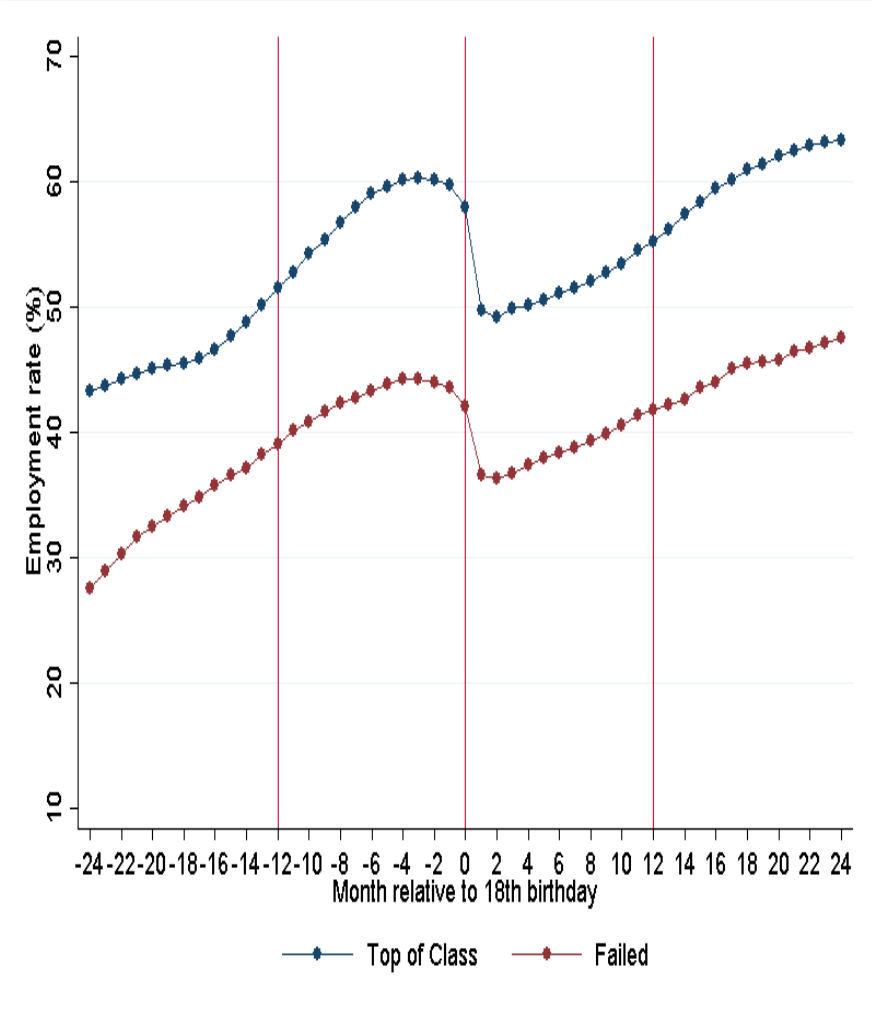
Basic salary in agreement increases by 55% at age 18

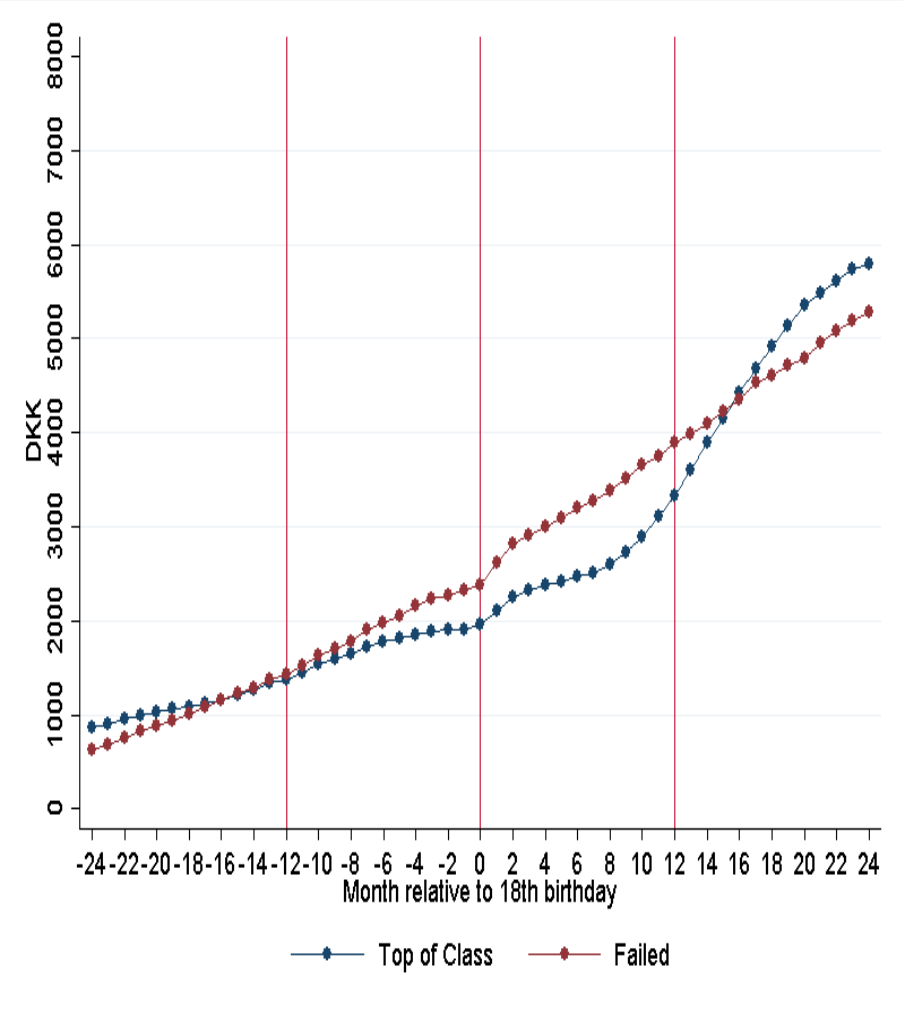
Change in agg. earnings ≈ 1% ⇒ elasticity of total hours $\varepsilon \approx$ **0.99**

Effects of min. wage on employment and income: Labor market entry and exit rates



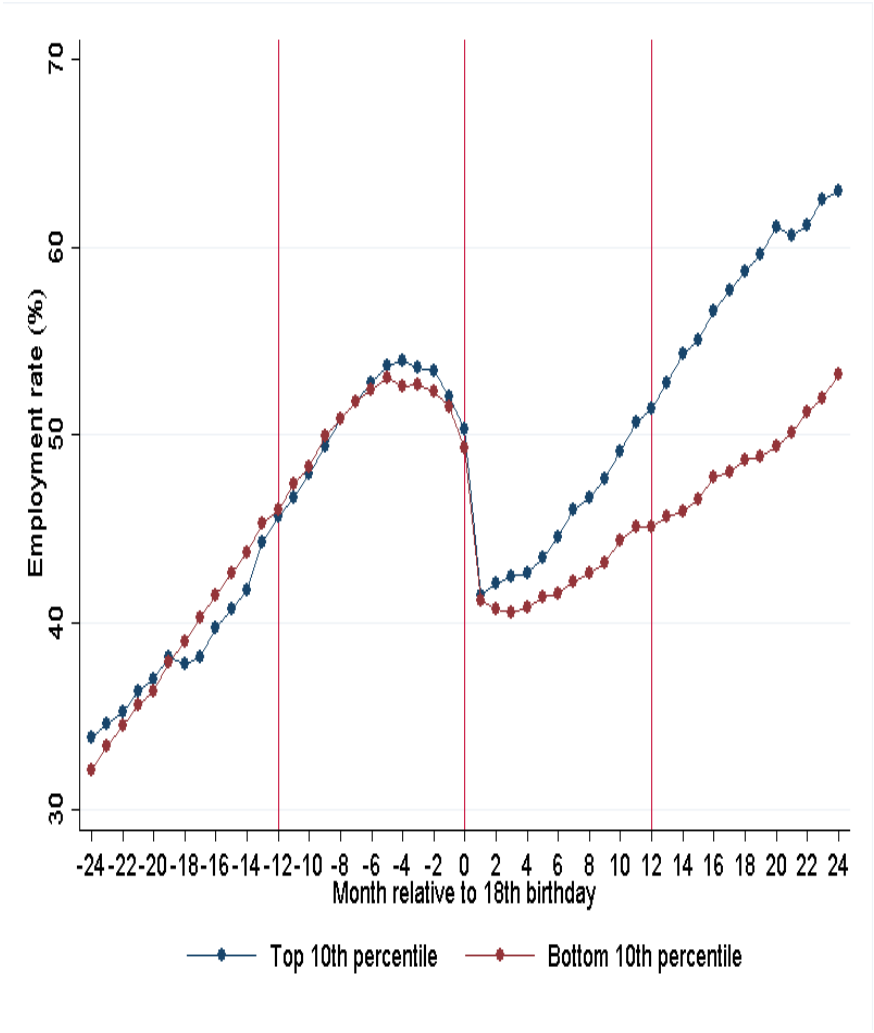
Effects of min. wage on equality: Employment and average earnings by school performance

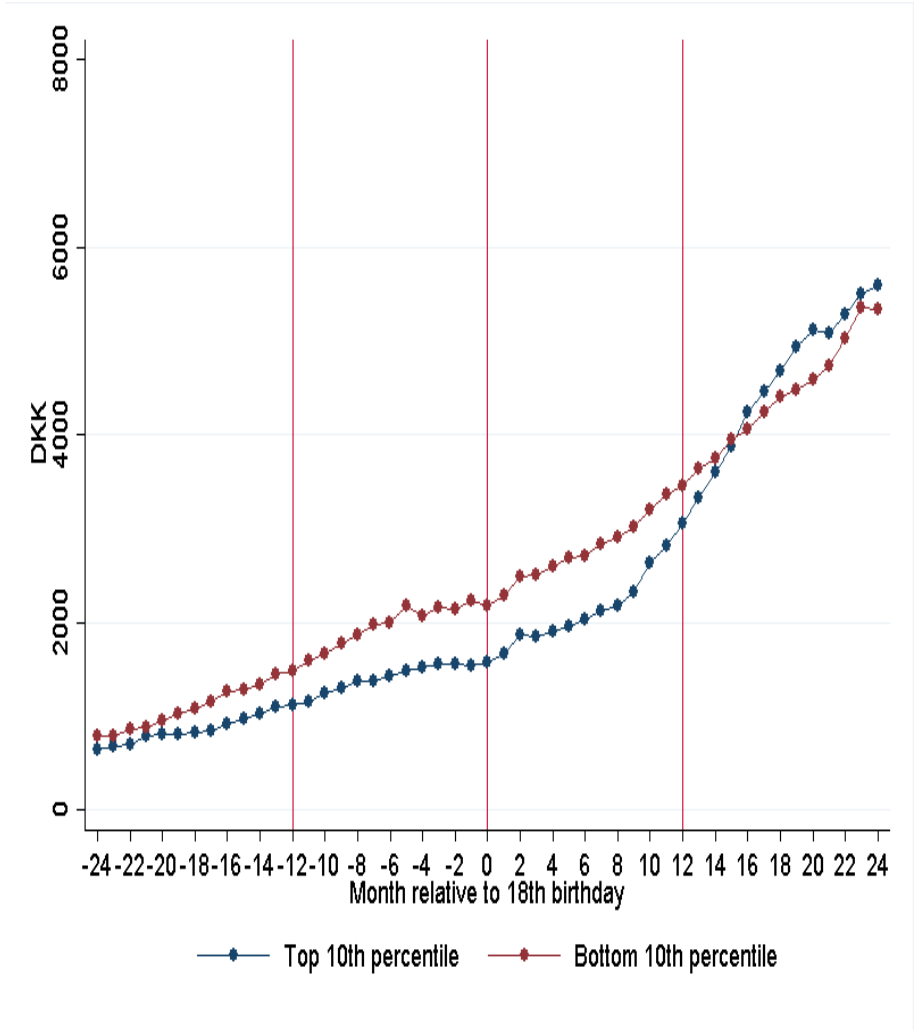




Doesn’t seem to be the case that the min. wage transfer resources to the ”weak”

Effects of min. wage on equality: Employment and average earnings by parental income





Doesn’t seem to be the case that the min. wage transfer resources to the ”weak”

Preliminary conclusions

Large jump in Danish minimum wages at age 18 causes a large drop in employment as workers turn 18

- Aggregate elasticity ≈ -1
- Largely driven by job loss
- Large elasticity compared to previous DD studies (change in youth min.wage vs change in global min.wage, long run vs short run effects, high min. wage in DK)

Lowering the age at which the high minimum wage apply to 16 yrs would have:

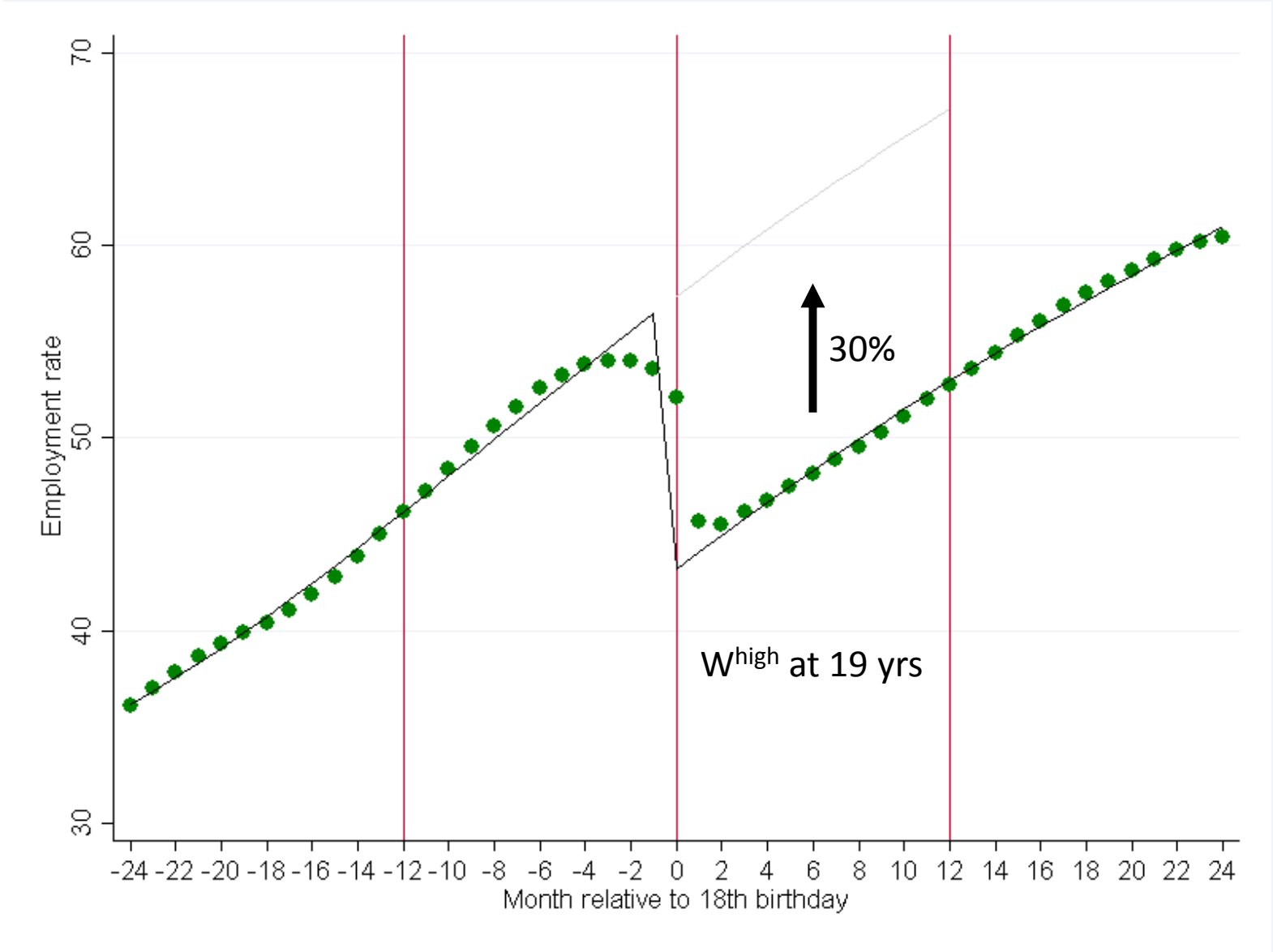
- A large negative effect on youth employment
- No significant impact on their aggregate wage income
- More inequality within the group

Spm. vedr. institutionelle forhold

- Indgår det eksplicit i kontrakt, at man mister job, når man fylder 18 år (eller indirekte ved kontraktens længde)? – mao. er den ansatte klar over det?
- Er arbejdsgivere klar over, at det ikke er aldersdiskriminering at fyre en person, som bliver 18 år?
- Søger man eksplicit for person under 18 år i jobopslag?
- Er det korrekt, at elever og lærlinge ikke har et lønspring ved 18 år?
- Andre vigtige forhold, når man bliver 18 år (salg af alkohol, håndtering af penge, indbetaling til pension…)?
- Har der været signifikante ændringer i lønforhold for unge i nyere tid?

EXTRA SLIDES

Policy experiment:
Effect of changing the age at which minimum wage hike occurs



Existing literature

Most studies find **small employment effects**

- **DiD** studies of policy changes in minimum wages
- **Short-run effect** + inflation/nominal minimum wage rules $\Rightarrow$ may seriously underestimate structural/permanent effect

Our method/contribution

Exploit a large **discontinuity** in minimum wages at age 18

- Strength: identifies a **long-run effect**
- Caveat: identifies a **local effect**

Existing literature

Basic theory

- In a simple **perfect competitive labor market** model, a binding minimum wage **reduces** employment and economic efficiency
- In a **monopsony/search model** of the labor market, a binding minimum wage **can increase** employment and economic efficiency (e.g. Flinn 2006 ECMA)

Organization of talk

- Existing literature
- Simple theory and empirical specification
- Institutions
- Data
- Empirical results
  - Effects of min. wage on employment and income
  - Effects of min. wage on inequality
  - Robustness
- Discussion

This paper

Research questions

- What are the long run effects of minimum wages on employment and average incomes of young people?
- Do minimum wages redistribute toward the weak individuals?

Research design

- Monthly payroll data on the population of Denmark
- Large discontinuity in minimum wage at age 18
- Examine wages, employment, job flows around this discontinuity

Main results

- Elasticity of youth employment w.r.t. minimum wage is $\approx$ -1
- No significant impact on total wages received
- No significant impact on overall inequality

Existing literature

Our method/contribution

Exploit a large discontinuity in minimum wages at age 18

- Strength: identifies a **long-run effect**
- Caveat: identifies a **local effect**

Related literature

- Jonassen (2013) and Elias (2015) study employment effects at age discontinuities in social assistance (DK) and in payroll taxes (Spain)
- Kabatek (2016) studies job separation at several small age discontinuities in Dutch minimum wage rules

Simple theory and empirical specification

Mirrleesian type labor market model

Differences in innate ability levels of individuals $\omega(i)$

Productivity of individual *i* in cohort *a* at time *t* equals

$$w(i,a,t) = \omega(i) + \alpha(a) + \gamma(t)$$

Minimum wage: $\overline{w}(a,t)$

Employment of cohort *a* at time *t*:

$$e(a,t) = 1 - F\left(\overline{\omega}(a,t)\right), \quad \overline{\omega}(a,t) \equiv \overline{w}(a,t) - \alpha(a) - \gamma(t)$$

Simple theory and empirical specification

Approximate the previous equation with an LPM

$$e(a,t) = \eta \bar{w}(a,t) + \tilde{\gamma}(t) + \tilde{\alpha}(a)$$

Parameter of interest η measures impact of minimum wage changes on employment

Empirical specification

$$d^{E}_{i,a,t} = \bar{w}_{a,t}\beta_1 + \mathbf{d}_t\boldsymbol{\beta}_2 + g(a) + \varepsilon_{i,a,t}$$

where β_1 is identified by the discrete jump in minimum wages at age 18, assuming that *g* is continuous

Institutional background

No statutory minimum wage in Denmark…

But minimum wages incorporated into **collective wage agreements** btw. trade unions and employers' organizations

Organized according to industry sector nationally

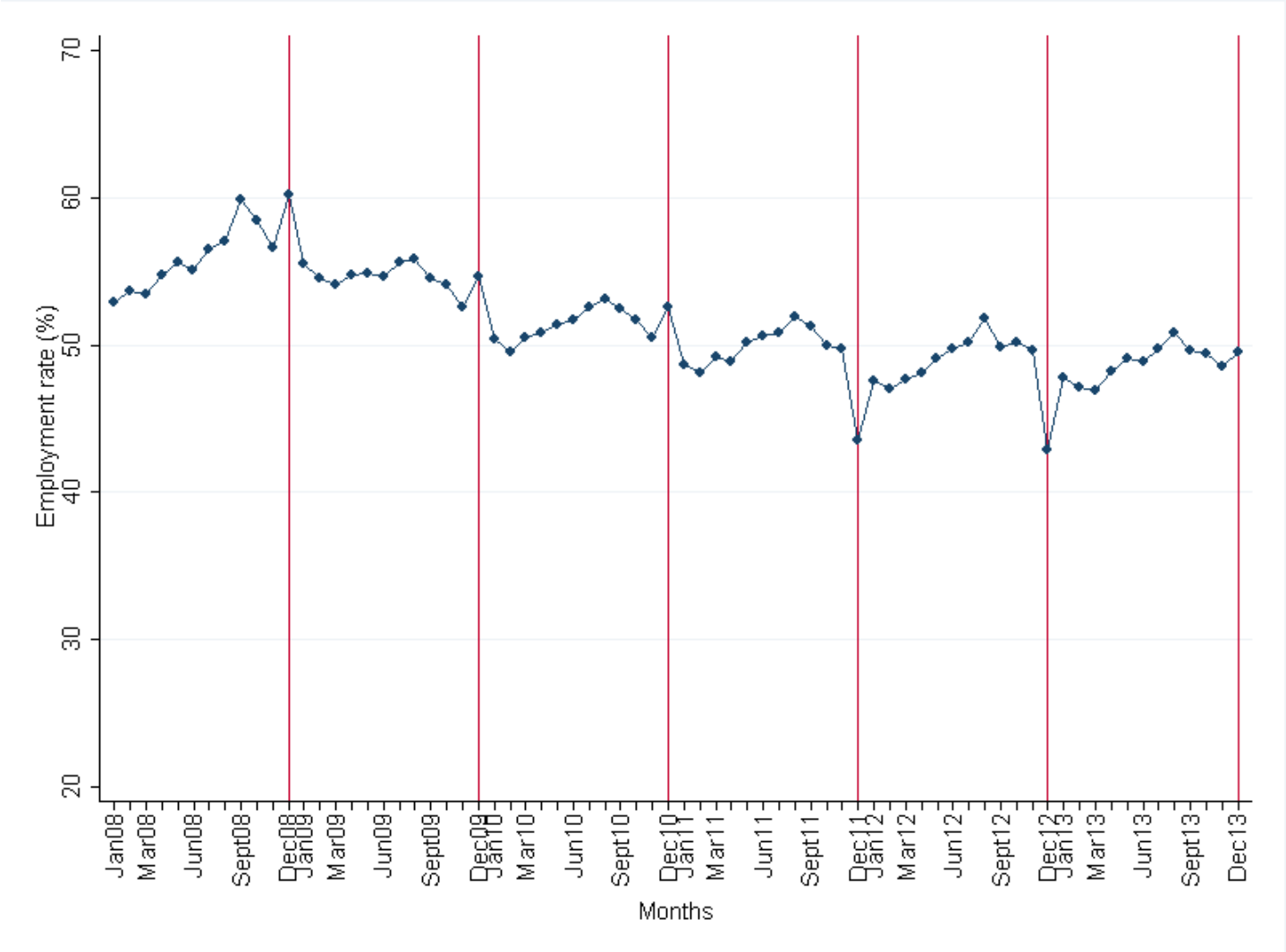
An agreement set actual pay rates or minimum pay rates at the industry level: may vary with age, experience, qualifications, performance, difficulty level of work, time of work etc.

Number of unions: 117

≈75% of employees are in a union, 80 % covered by a collective agreement

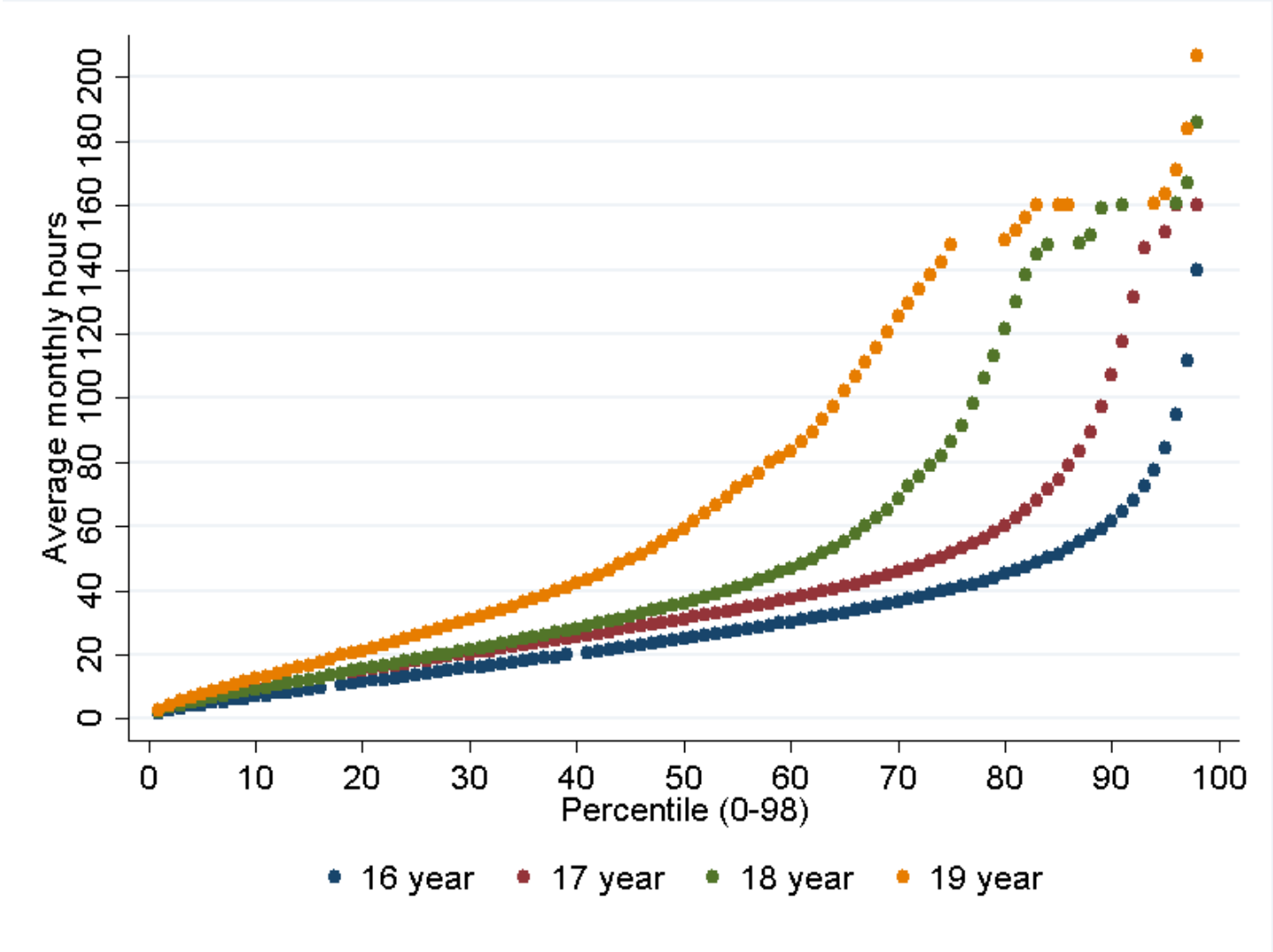
MOST IMPORTANTLY: The minimum wage **increases sharply at age 18** in all collective agreements

Data:
Employment rate of 16-19 years old over time

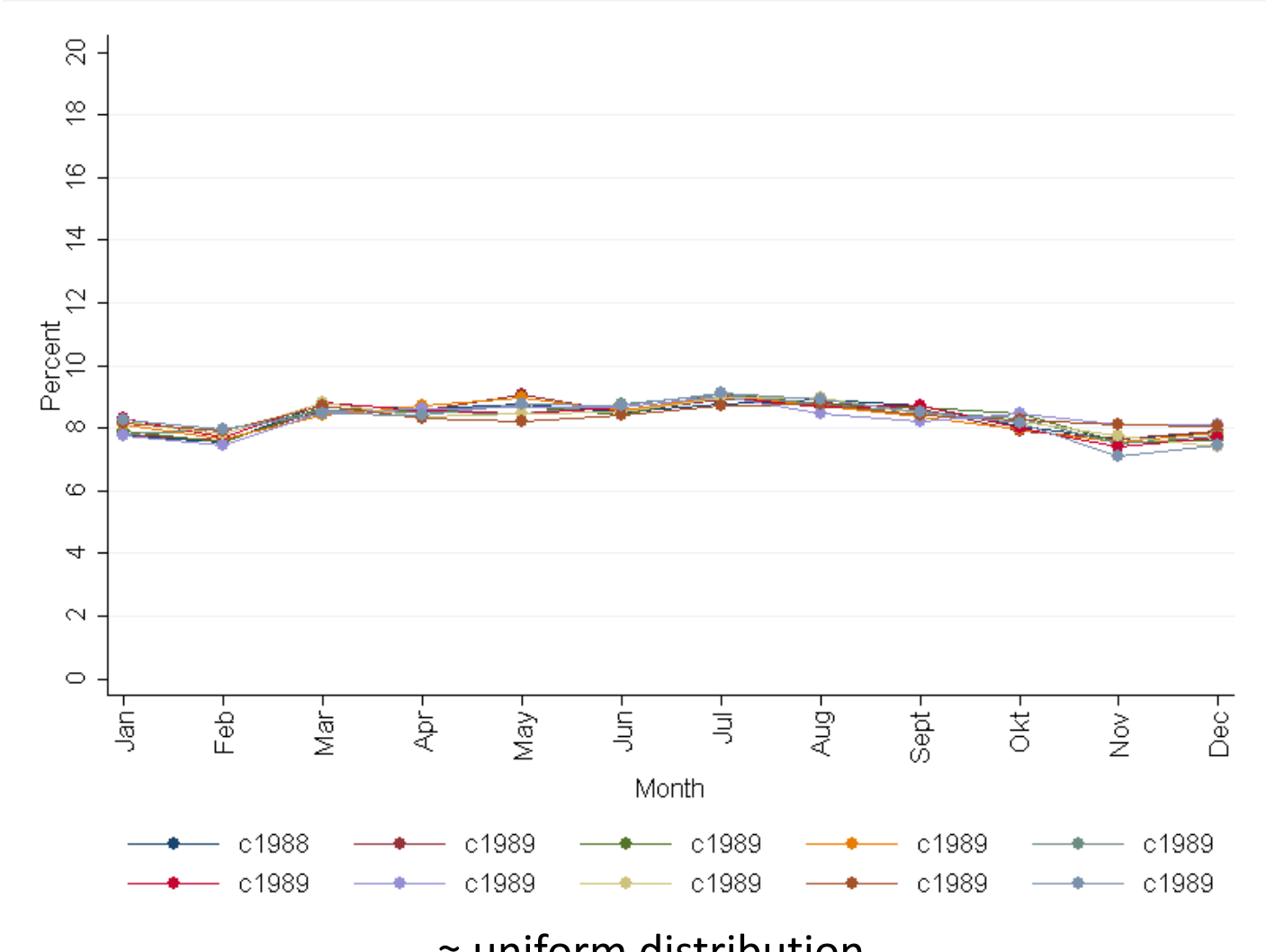


Employment defined as earnings ≥ DKK 100 in a given month from an employer

Data:
Hours worked for employed by age



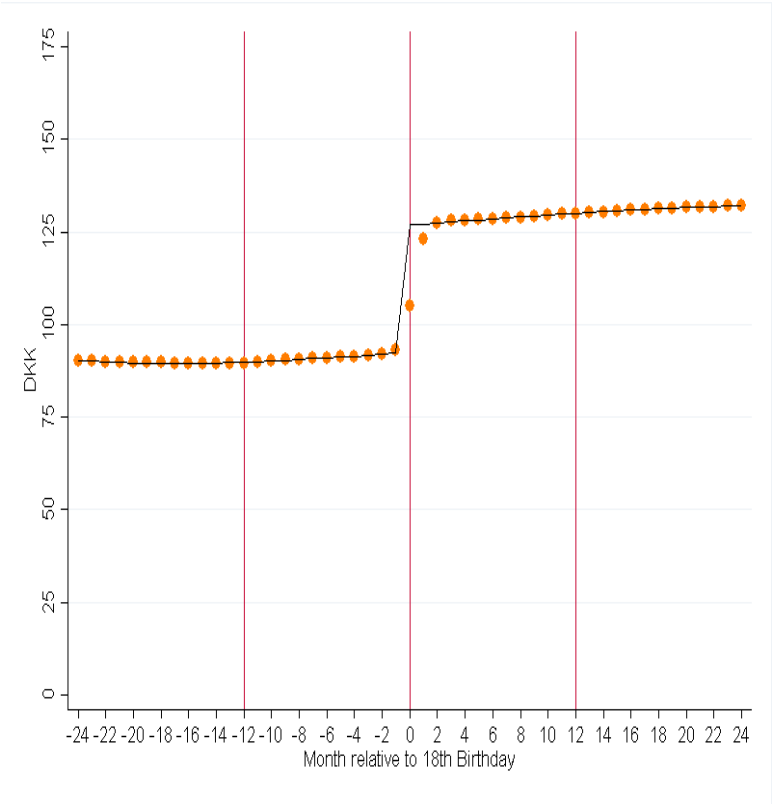
Data:
Distribution of births by month



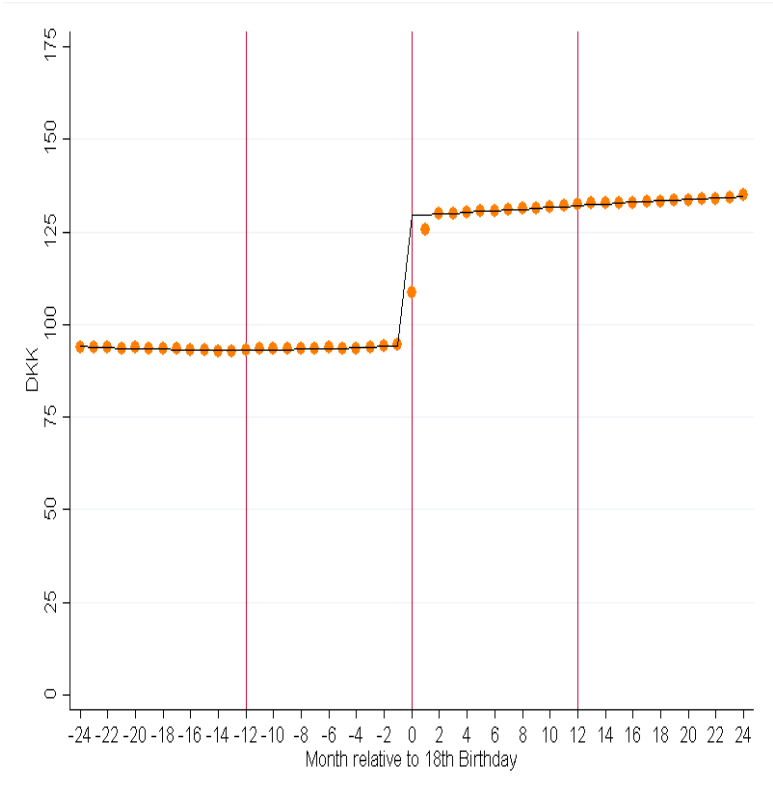
≈ uniform distribution

Robustness:
Hourly wage by age: selection bias?

All individuals



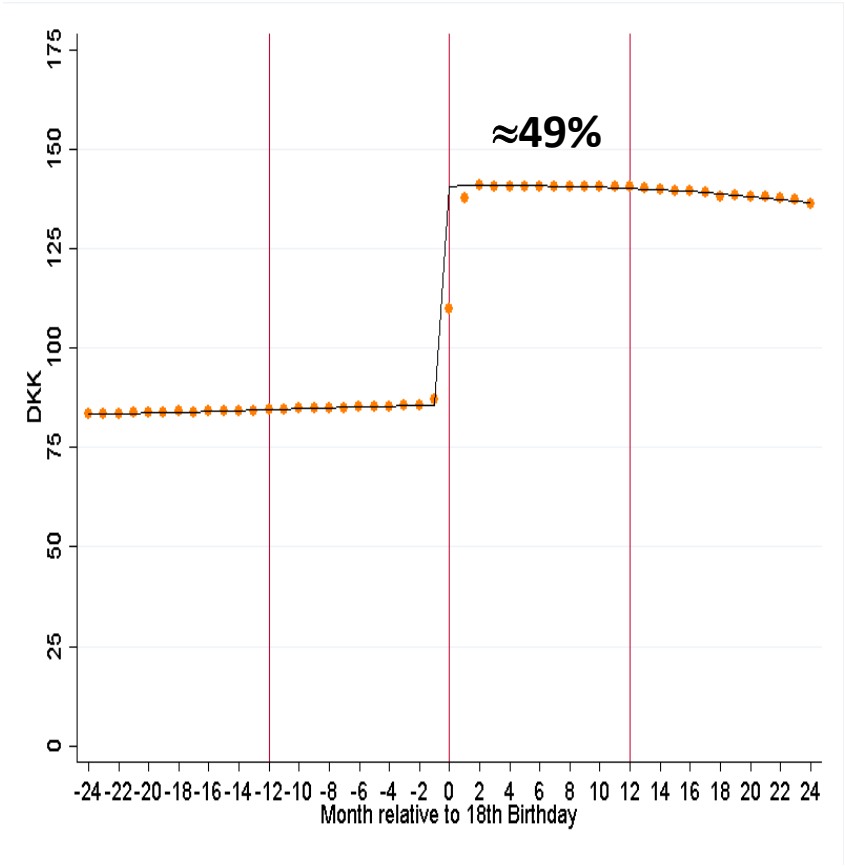
Employed t=-2,-1,0,1,2



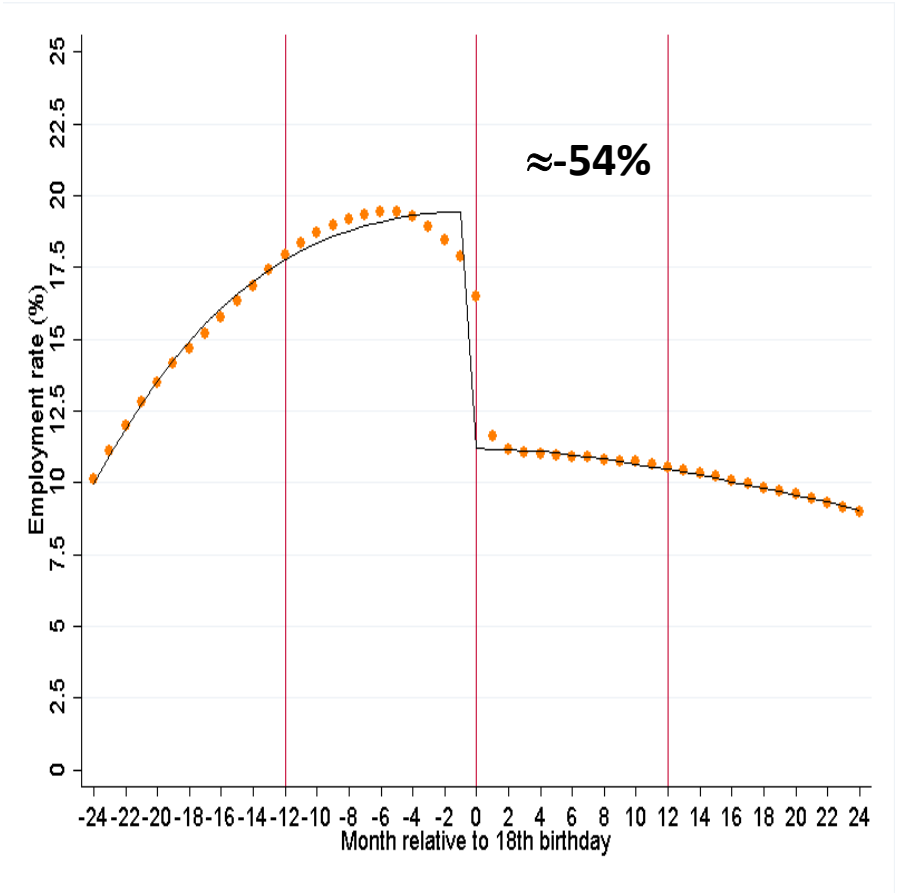
Change at age 18: **31 percent in both cases**

Effects of min. wage on employment and income: Supermarkets (34%)

Hourly wage



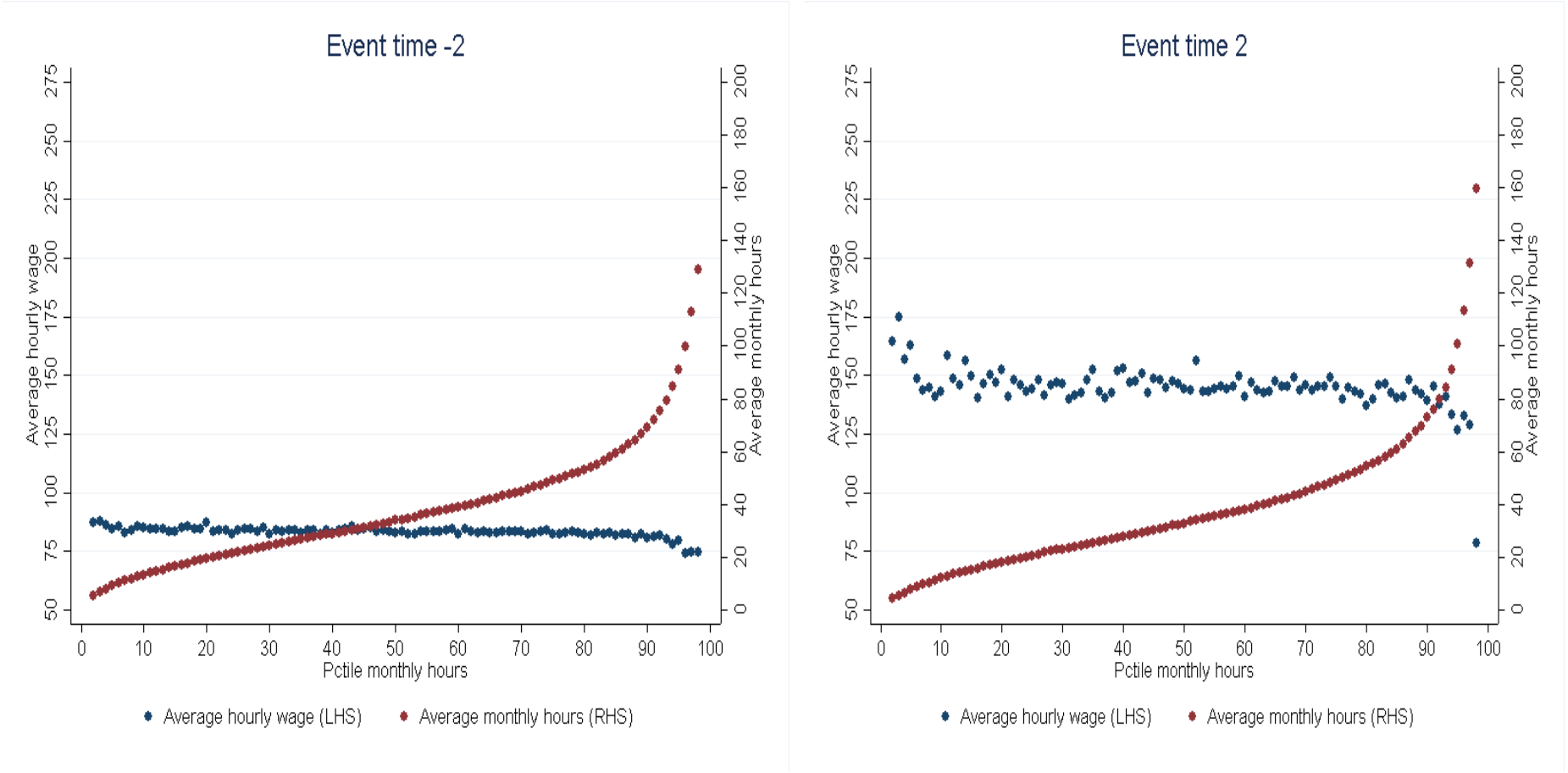
Employment rate



Basic salary in agreement increases by 55% at age 18

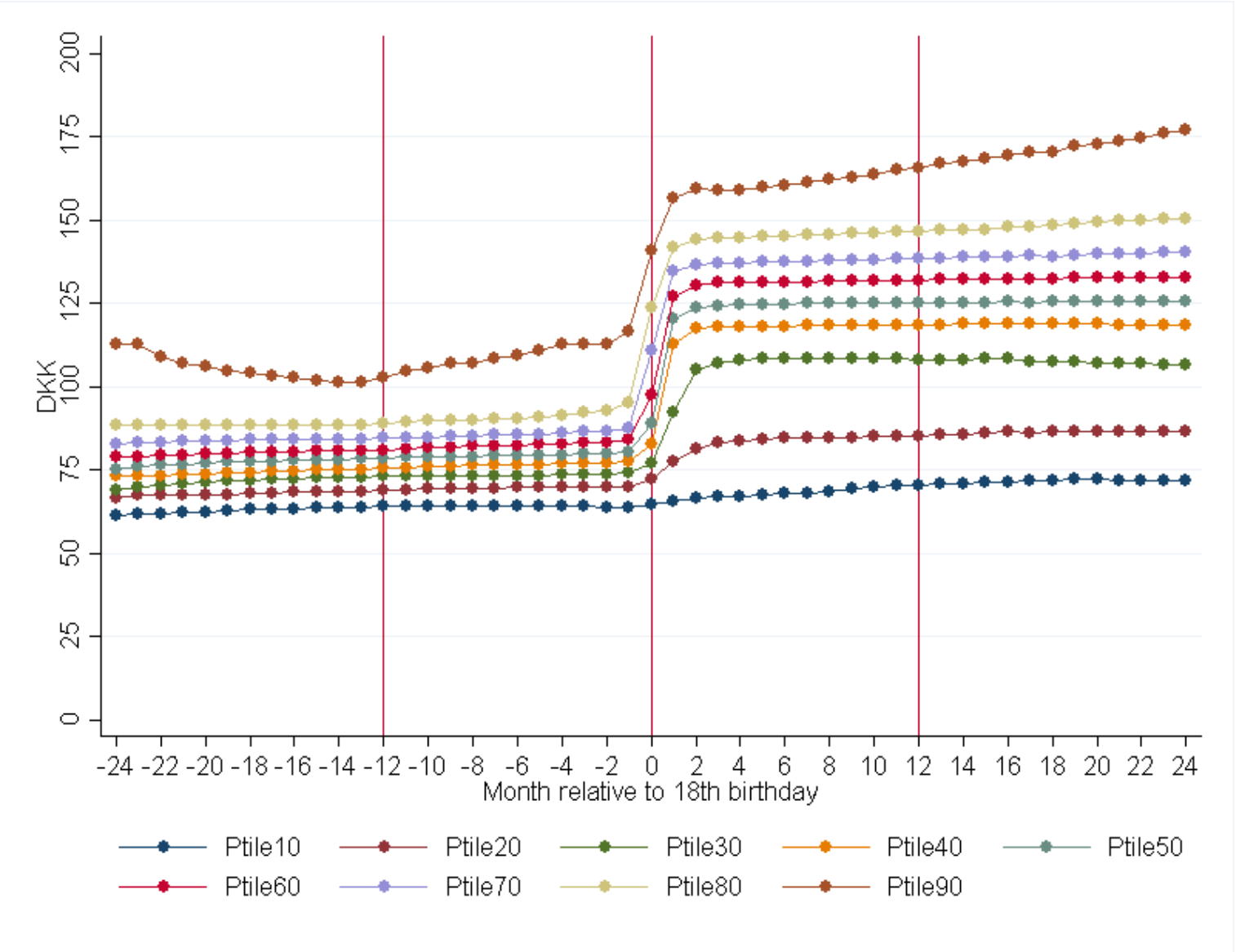
Change in agg. earnings ≈ -23% $\Rightarrow$ elasticity of total hours $\varepsilon \approx$ **1.23**

Robustness:
Hourly wage by age: measurement error?



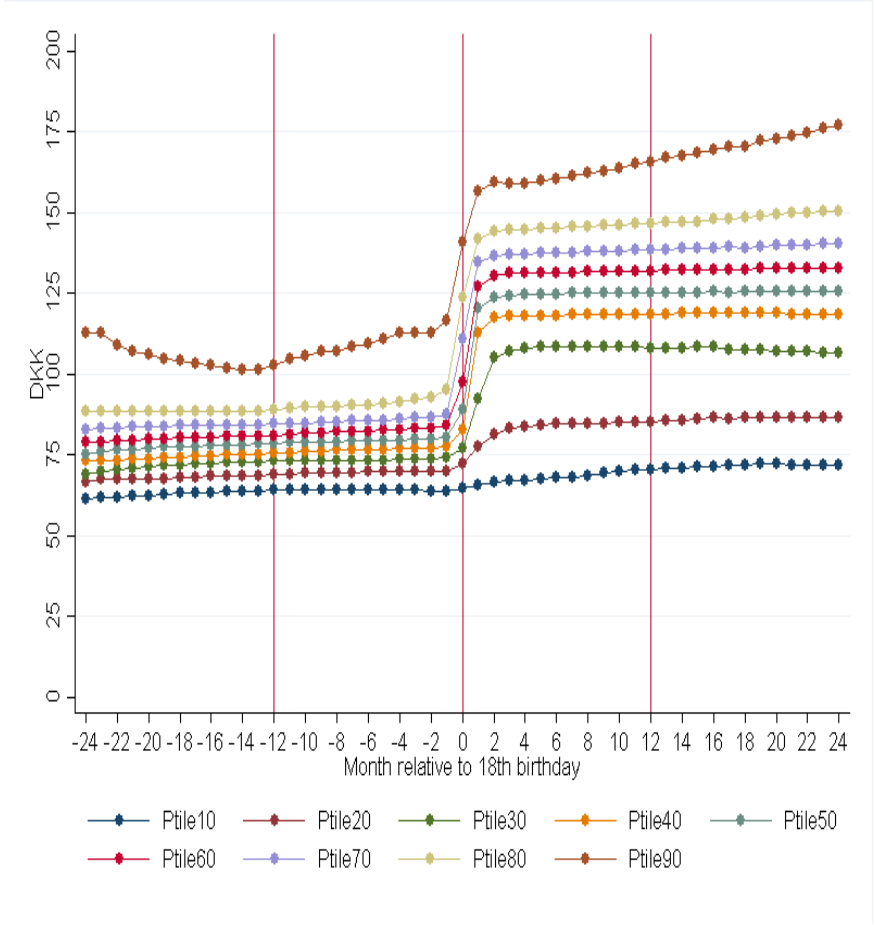
Slightly decreasing, which could be due to measurement error, but also that weekend work is more common for people with short work hours

Robustness:
Hourly wage distribution by age

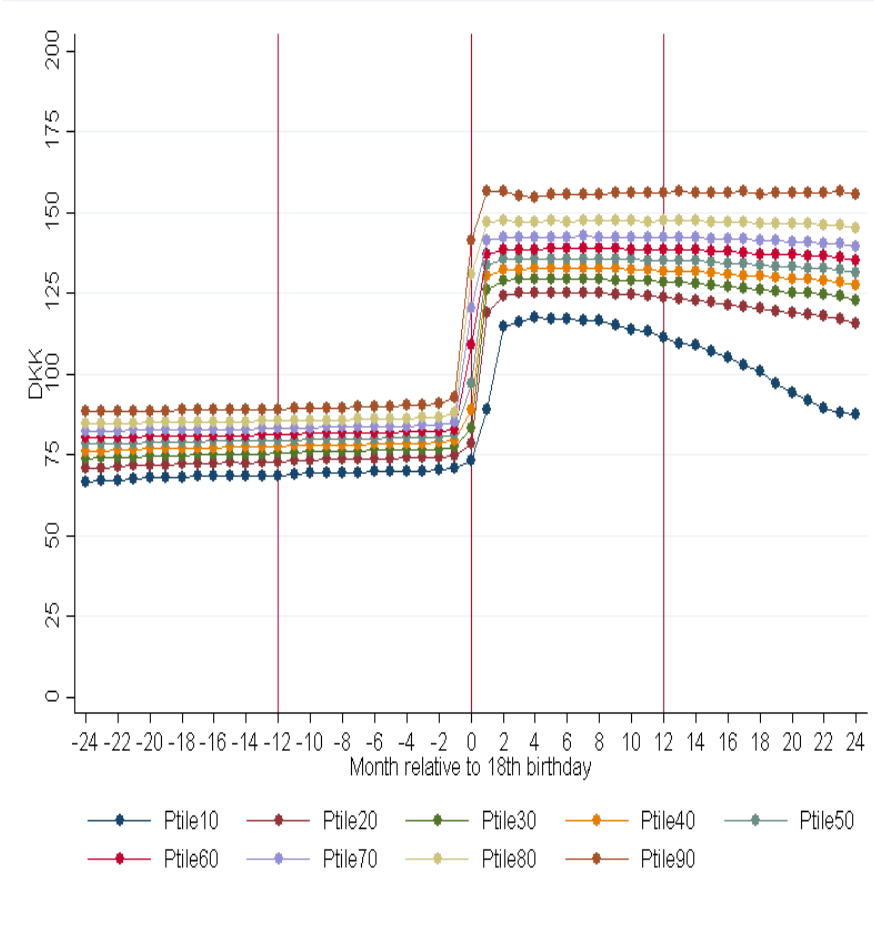


Robustness:
Hourly wage distribution by age

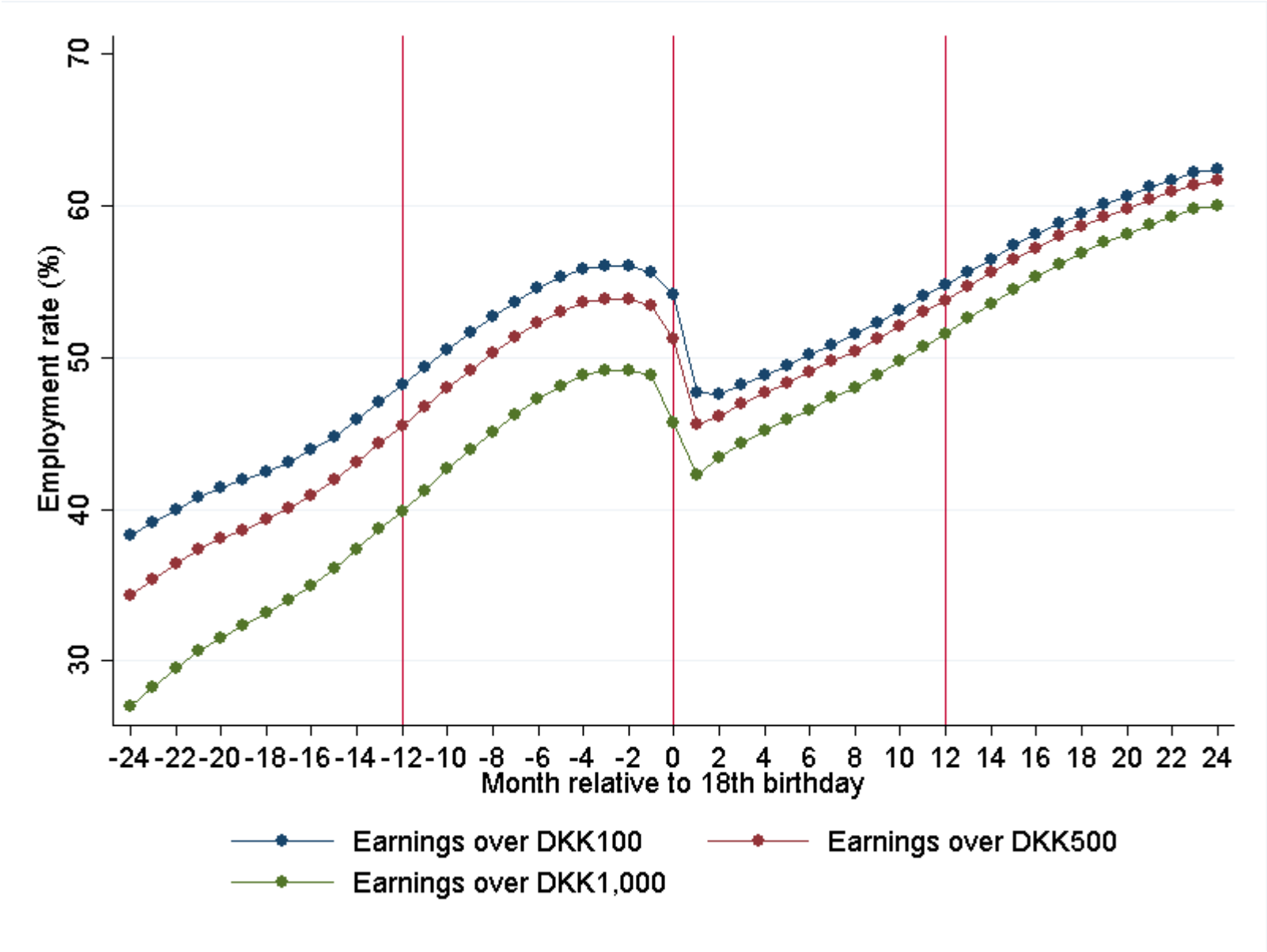
All sectors



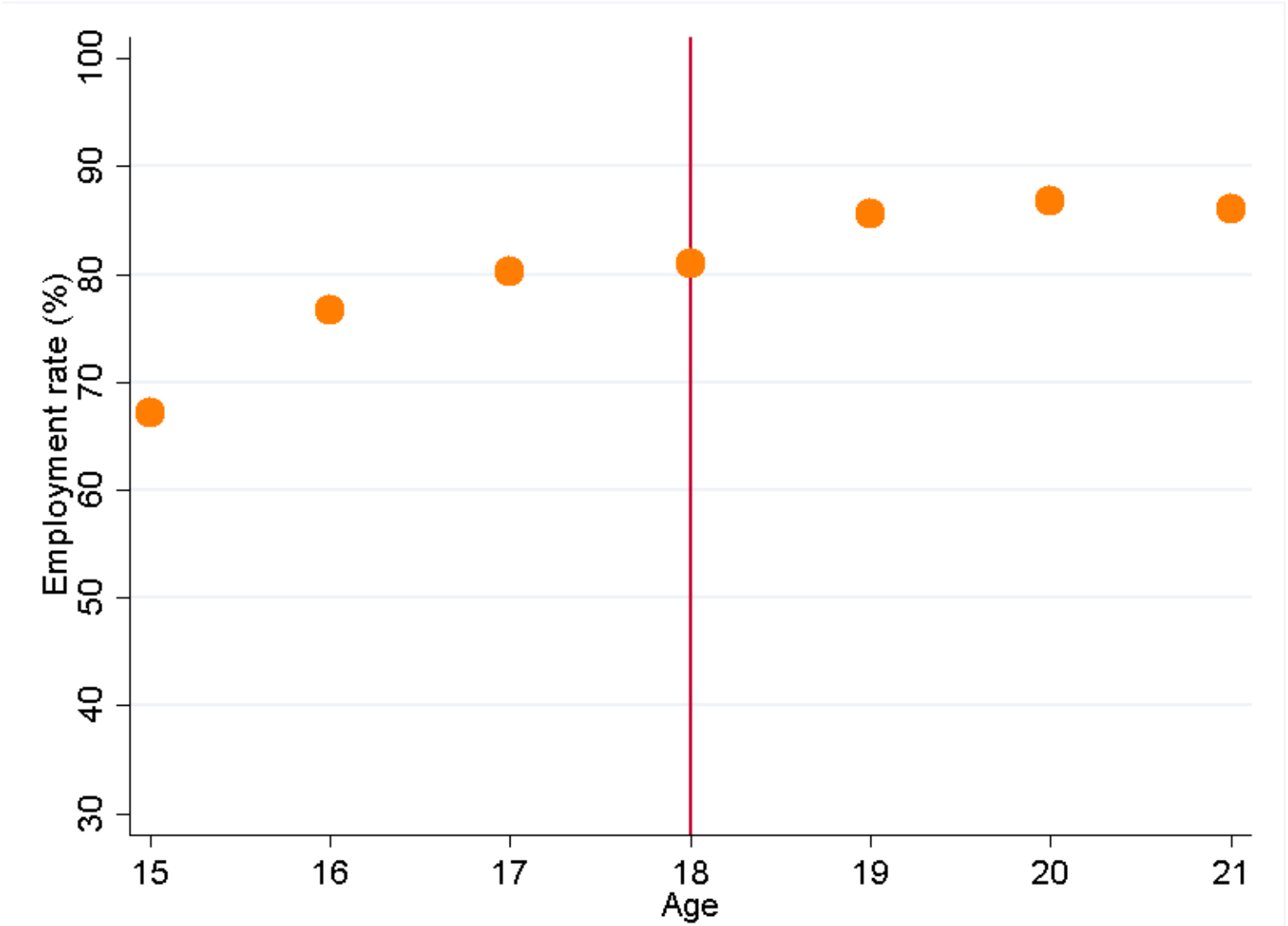
Supermarkets



Robustness:
Different employment criteria



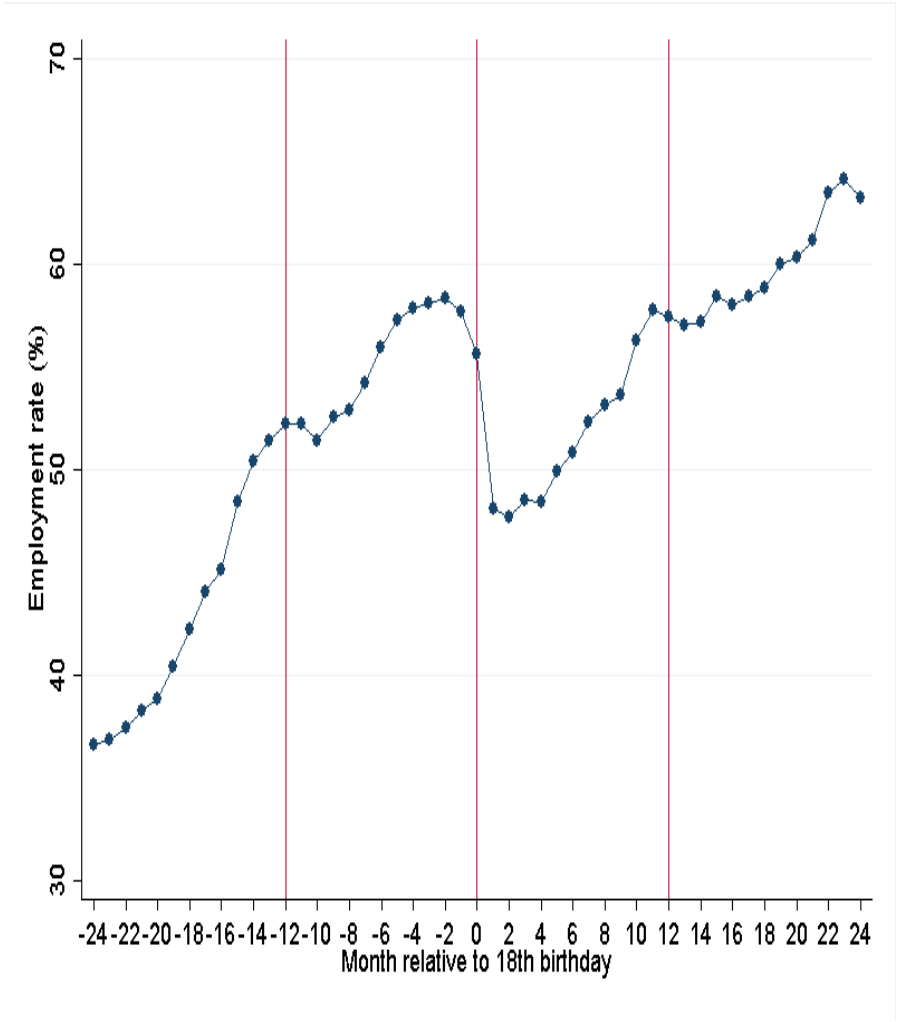
Robustness:
Yearly data 1981-2013



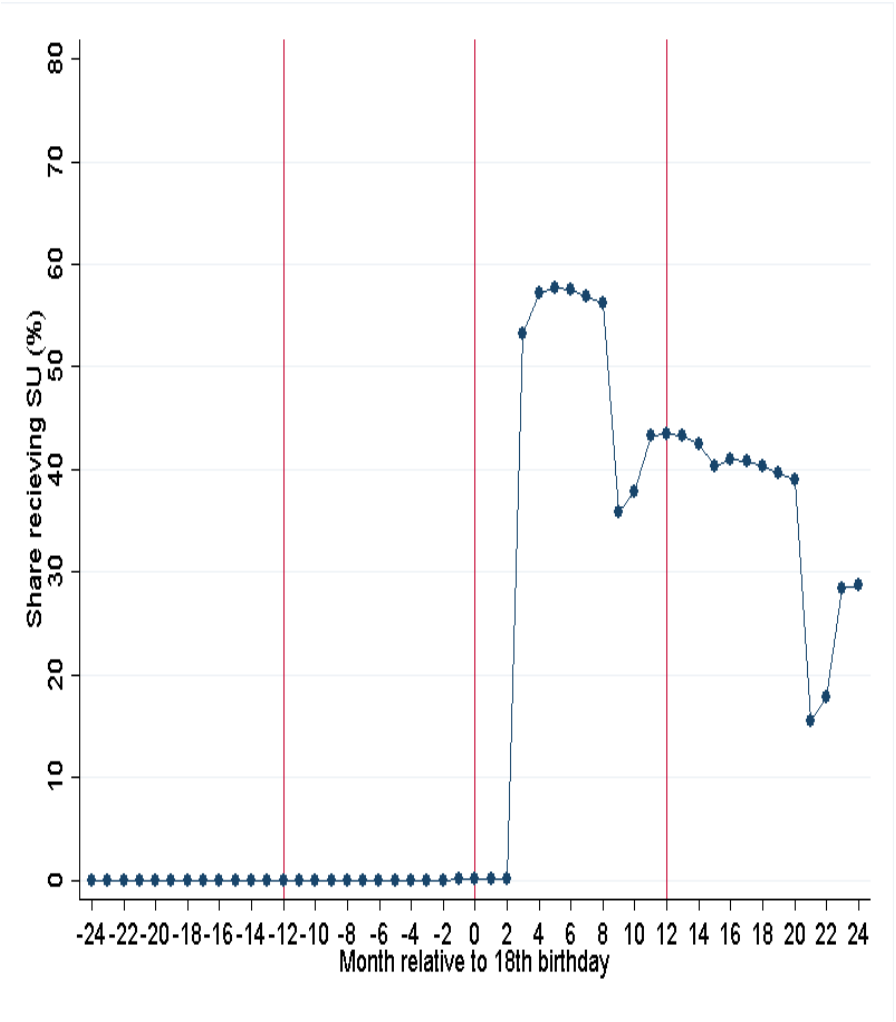
The effect is visible but seriously underestimated because of time trend

Robustness:
Employment and student benefits (SU) for individuals born in October

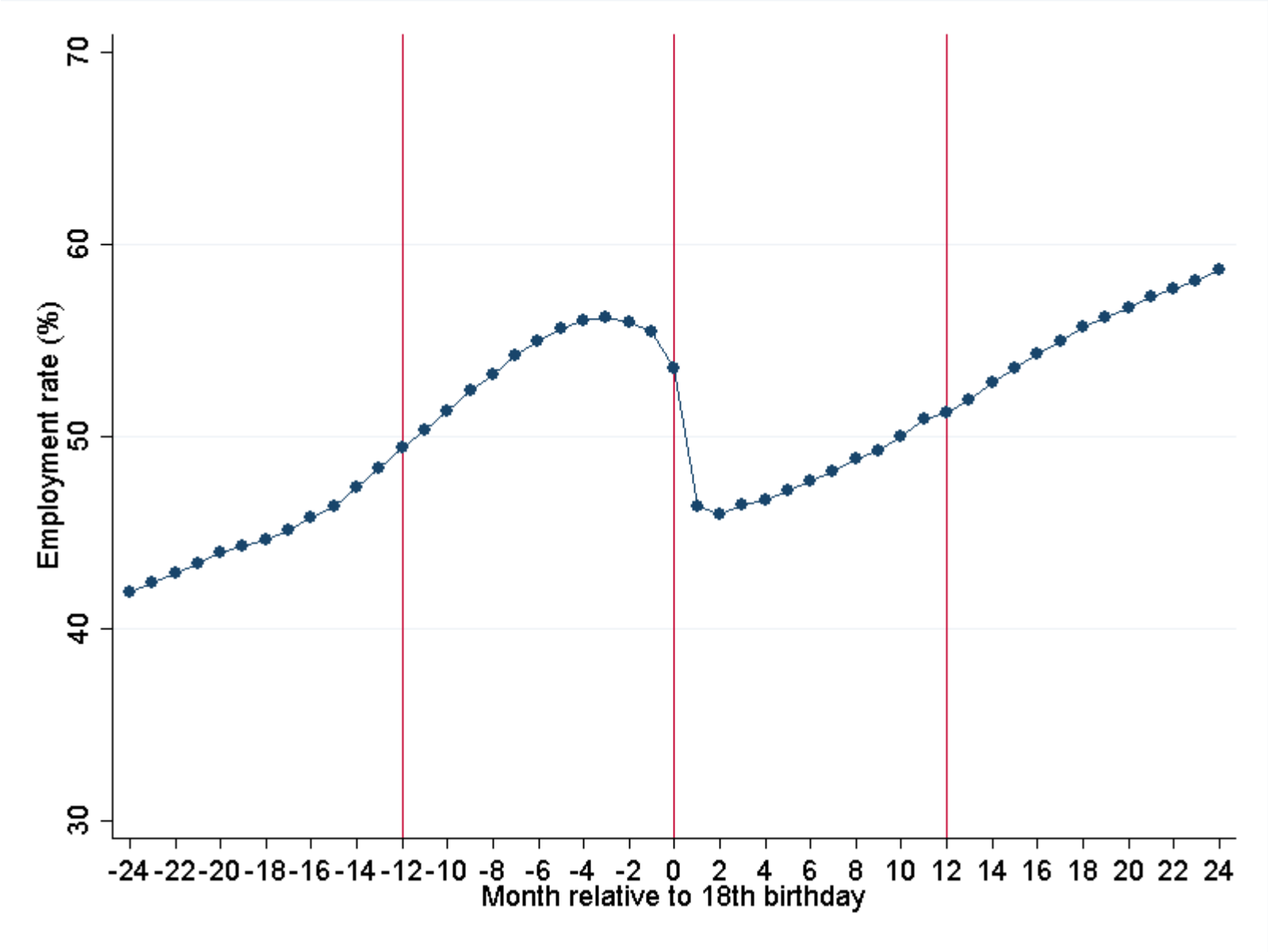
Employment



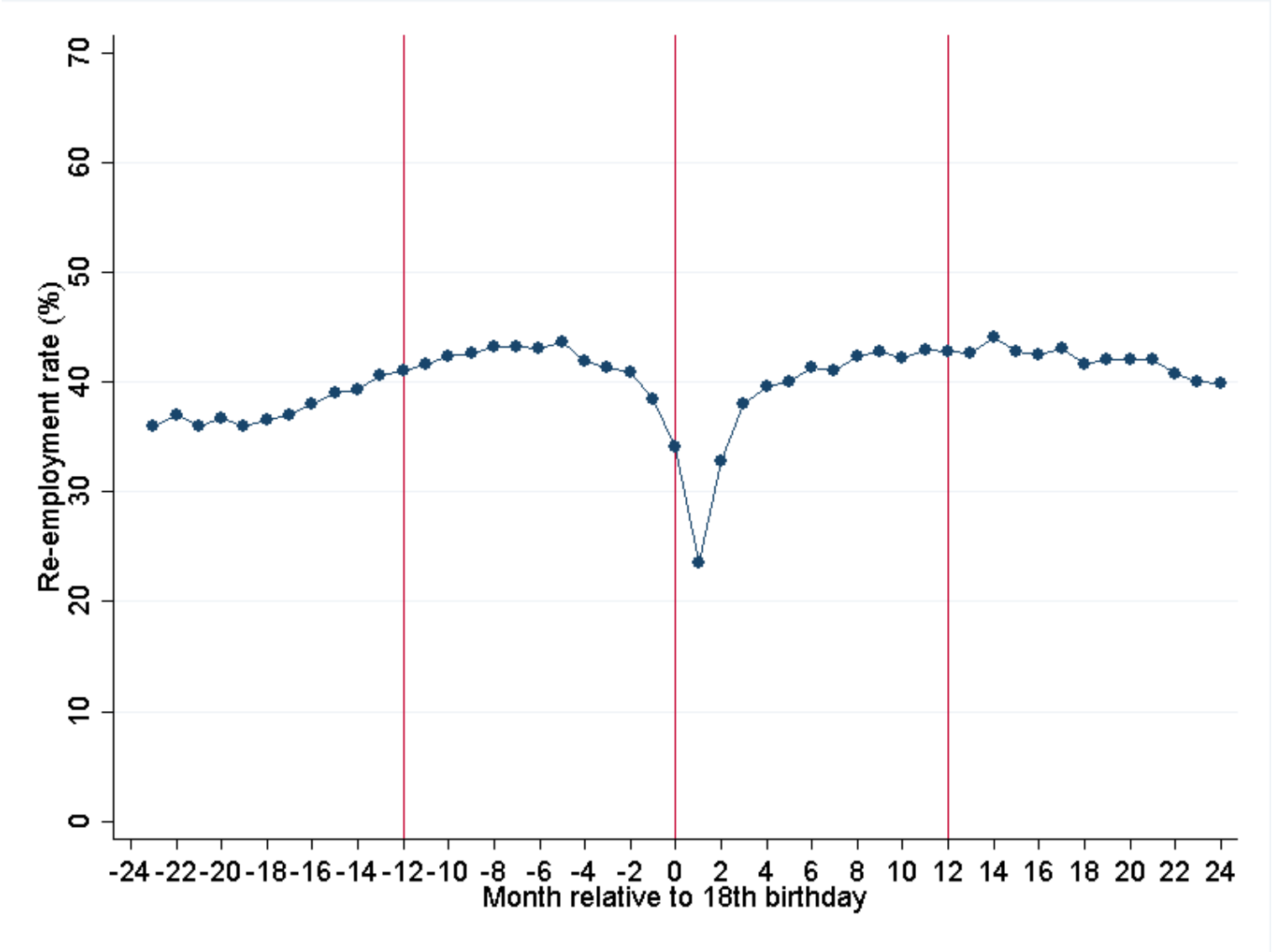
Student benefits



Robustness:
Balanced panel (birth cohorts 1992-1993)



Robustness:
Employment status 1 month after job loss



Simple theory and empirical specification

Not in the model

A) Decreasing returns to labor

- Increasing min. wage for ≤18-year olds → higher demand for >18-year olds' labor; **higher employment**
- Is decreasing returns a viable assumption for the long-run?
  - Capital intensity fixed by rate of time preference (e.g. Ramsey) → Forces labor demand to be horizontal

B) Imperfect substitution across age groups

- Increasing min. wage for ≤ 18 year olds → >18 year olds are less productive; **lower employment**

Cross-worker effects also an issues in diff-in-diff studies

C) Imperfect competition, search frictions

Additional theory

Extension 1: Embed simple model into standard eq. search setting $\Rightarrow$

- Firms will reduce low-productivity workers/jobs when turning 18 $\Rightarrow$ jump in exit rate
- Increase in min.wage, age$\geq$18 $\Rightarrow$ *reduction* in employment, age<18
- Increase in min.wage, age<18 $\Rightarrow$ *reduction* in employment, age $\geq$18

Extension 2: Decreasing demand for low-skilled labor $\Rightarrow$

- Increase in min.wage, age<18 $\Rightarrow$ *increase* in employment, age $\geq$18
- Our estimate of the employment effect, age<18 is a good approximation because the share of age<18 in low-skilled labor input is small

Limitations and ways to improve the analysis?

Include other theory?

- E.g. model with homogenous labor and search frictions

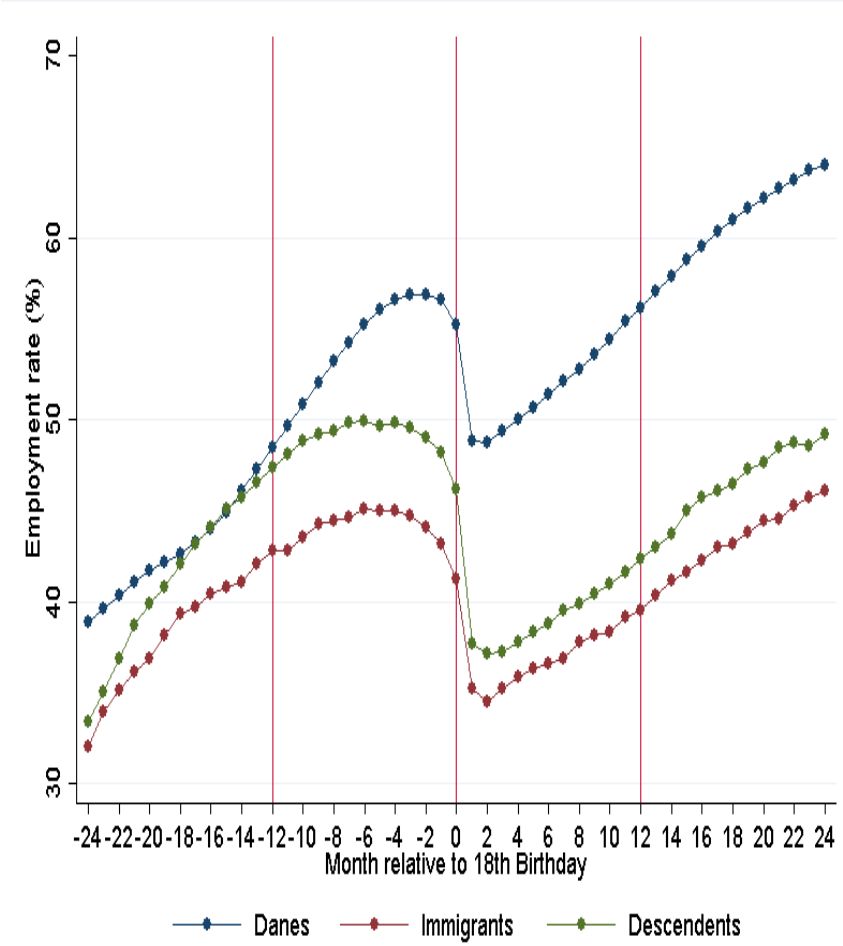
Possibility of cross-age substitution, GE effects etc.?

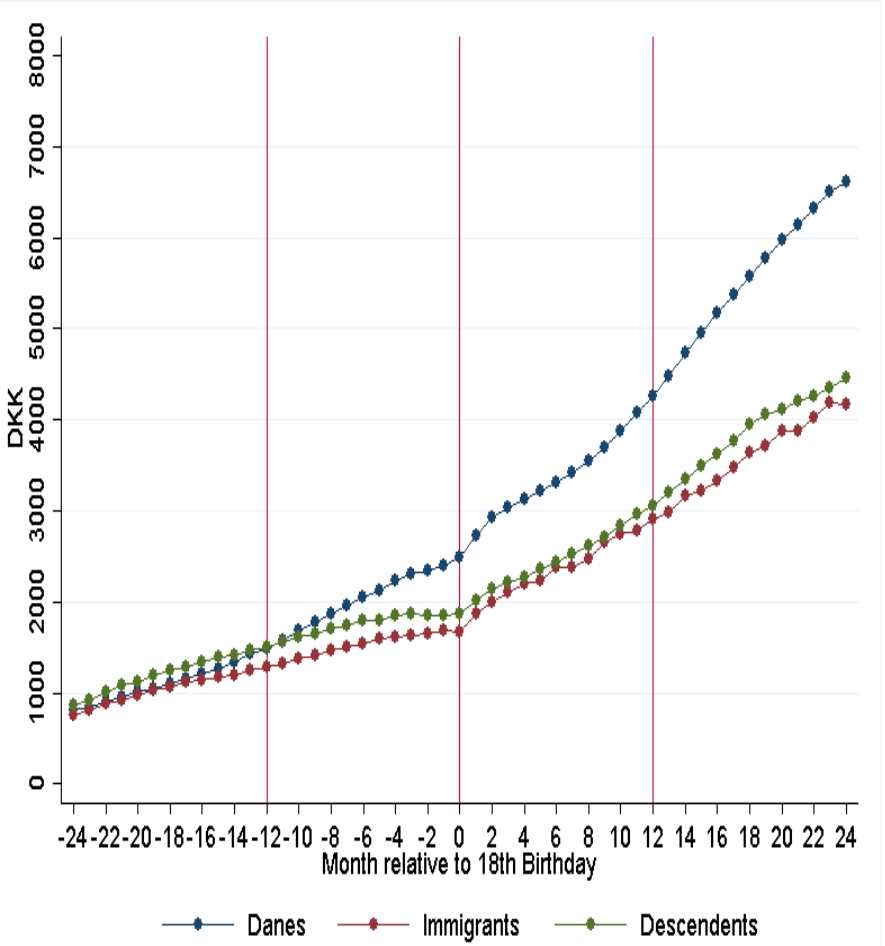
- Not in the simple theory… other ways to address these issues?

Empirical analysis?

- Identify and exclude apprentices
- Look more into the possibility of a hike in transfers at age 18
- Other ways to identify “weak” in analysis of inequality?
- Better ways to estimate the wage elasticity?

Effects of min. wage on equality:
Employment and average earnings by country of origin





Doesn’t seem to be the case that the min. wage transfer resources to the ”weak”