



# The Labour Market Module: data, estimations and results

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**IESS**

Improving Effectiveness  
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# AD-SILC dataset: contents and features

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- **AD-SILC** is an **unbalanced panel dataset** containing both:
  - retrospective information on individuals' working conditions before the year of survey of SILC, and
  - forward-looking information on individuals' working conditions after the year of survey of SILC.
- **Panel INPS** - longitudinal data of individuals' working history since their entry in the LM: occupational status, income evolution, contribution accumulation, etc.
- **Panel SILC** - longitudinal data of individual socio-economic characteristics (up to 4 years): education, marital status, number of children, etc.

# Analyses, regressions and projections (1)

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- Analyses of the workers' dynamics in Italy – evidence from the AD-SILC dataset:
  - Transition matrixes
  - Earnings distribution trends
  - Accumulation of pension contributions

# Analyses, **regressions** and projections (2)

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- Regressions used in the model are based on the **entire** dataset AD-SILC.
- ⇒ All individuals in IT-SILC 2004-2012 and the respective working and contribution history carried out by INPS are considered over the period 1998-2011.
- Modelling the demographic dynamics
  - Modelling the working statuses
  - Modelling the earnings process

## Analyses, regressions and **projections** (3)

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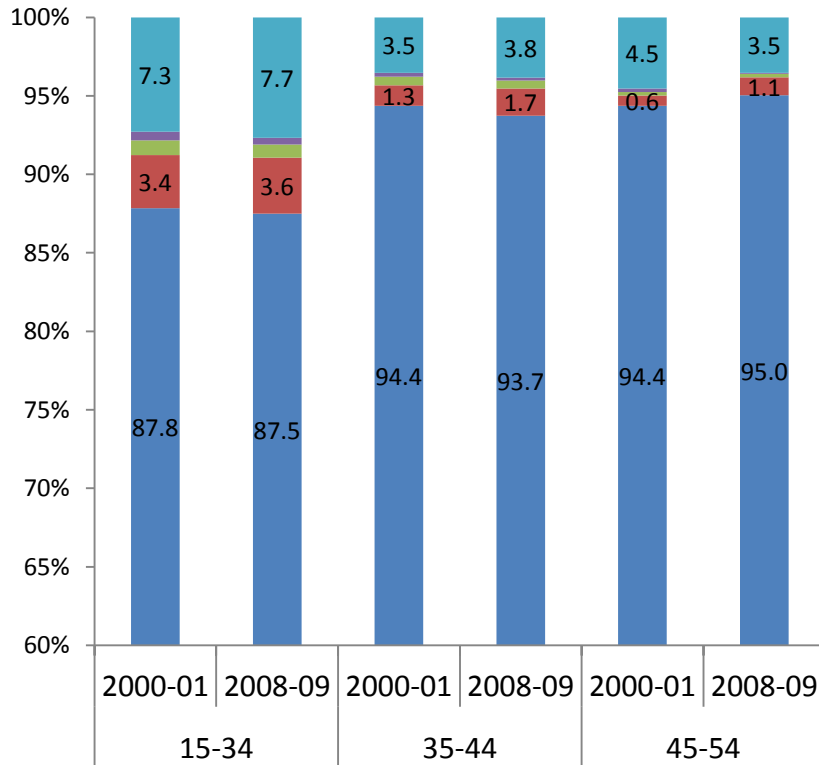
- Simulations – based on a **single extract** of AD-SILC.
  - **2011** is the **starting point** of the simulation, with a sample which is representative of the Italian population in that year.
  - The dataset is **cross-sectional**, integrated with retrospective information about working conditions, acquired work experience, total number of years of contribution, etc.
- ⇒ The base sample of the model includes individuals surveyed in SILC 2011 and the respective working, labour income and contribution conditions registered in INPS archives.

# Some evidence on the labour market conditions in Italy from the AD-SILC dataset

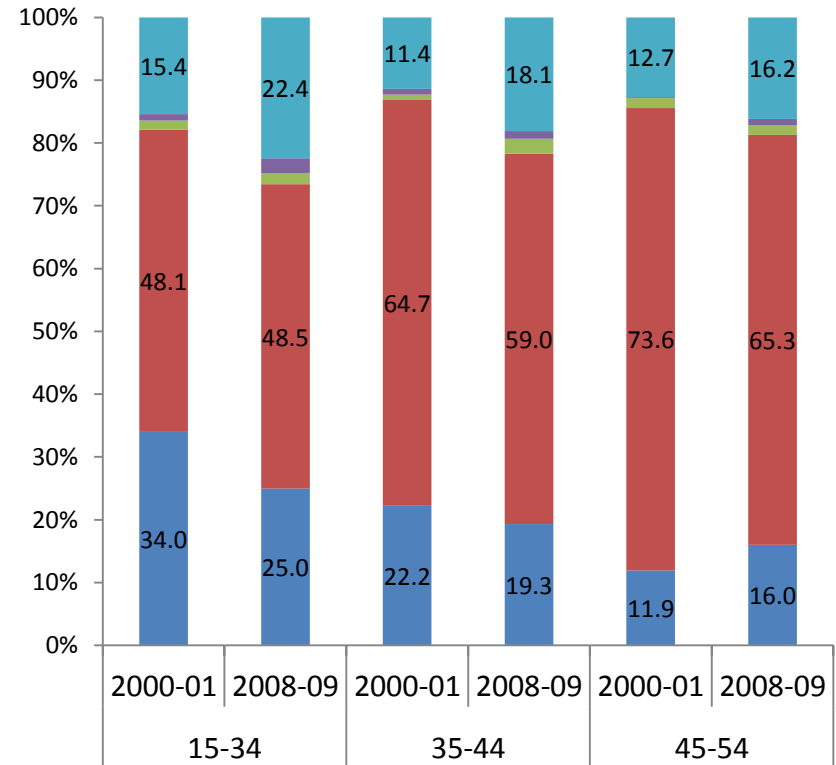
# LM transitions

## Transitions between working statuses after 1 year – 2000 vs 2008

### Open-ended employees



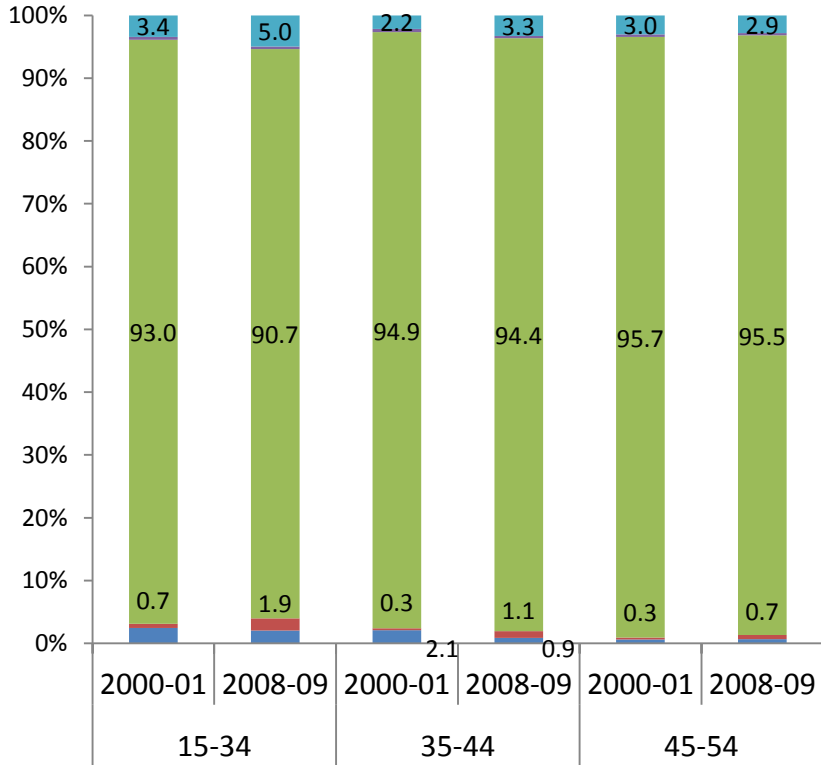
### Fixed-term employees



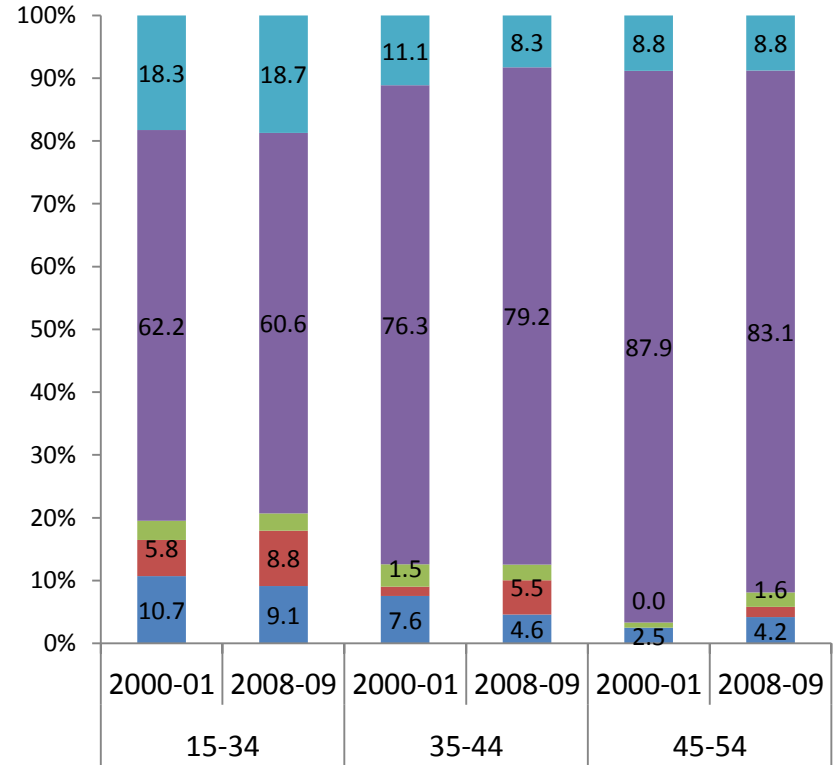
■ Perm ■ Fixed ■ Self-empl. ■ Atypical ■ Out of work

# Transitions between working statuses after 1 year – 2000 vs 2008

## Self-employed



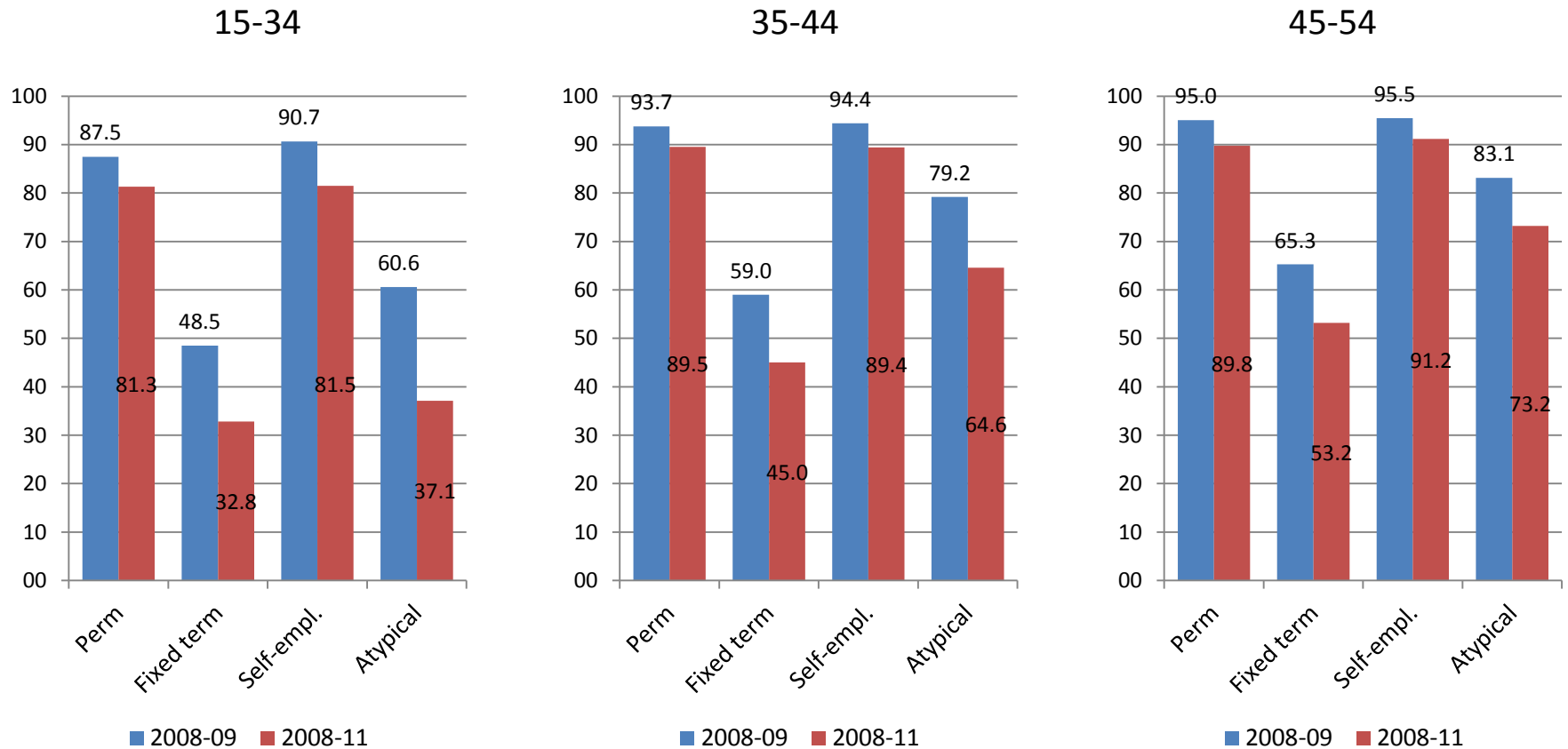
## Atypical workers



■ Perm ■ Fixed ■ Self-empl. ■ Atypical ■ Out of work



## Persistence in the work state in 2008 after 1 and 3 years (by age class)



# Working conditions after 1 year of those employed in 2008 (by education)

## At most lower-secondary

2008	2009				
	Perm.	Fixed Term	Self-empl.	Atypical	Out of work
<b>Perm</b>	<b>91.2</b>	2.4	0.5	0.1	5.8
<b>Fixed Term</b>	18.3	<b>60.6</b>	1.9	0.4	18.8
<b>Self-empl.</b>	0.9	1.1	<b>93.0</b>	0.4	4.6
<b>Atypical</b>	7.4	2.8	4.6	<b>76.9</b>	8.3

## Upper-secondary

2008	Perm.	Fixed term	Self-empl.	Atypical	Out of work
<b>Perm.</b>	<b>94.6</b>	1.4	0.5	0.2	3.3
<b>Fixed</b>	19.5	<b>58.8</b>	2.8	1.5	17.5
<b>Self-empl.</b>	0.8	1.1	<b>94.8</b>	0.3	3.0
<b>Atypical</b>	4.1	3.7	2.5	<b>80.4</b>	9.4

## Tertiary

2008	Perm.	Fixed term	Self-empl.	Atypical	Out of work
<b>Perm.</b>	<b>95.8</b>	1.4	0.5	0.5	1.8
<b>Fixed</b>	23.0	<b>53.6</b>	2.6	3.8	17.0
<b>Self-empl.</b>	1.0	1.0	<b>96.1</b>	0.4	1.5
<b>Atypical</b>	3.9	8.2	1.7	<b>80.3</b>	6.0

## Working conditions after 3 years of those employed in 2008 (by education)

### At most lower-secondary

2008	2011				
	Perm	Fixed Term	Self-empl.	Atypical	Out of work
Perm	<b>85.0</b>	4.3	1.7	0.3	8.8
Fixed Term	29.4 ←	<b>49.5</b>	2.8	0.8	17.5 ↓
Self-empl.	3.5	2.2	<b>86.9</b>	1.0	6.4
Atypical	20.4	6.1	9.2	<b>54.1</b>	10.2

### Upper-secondary

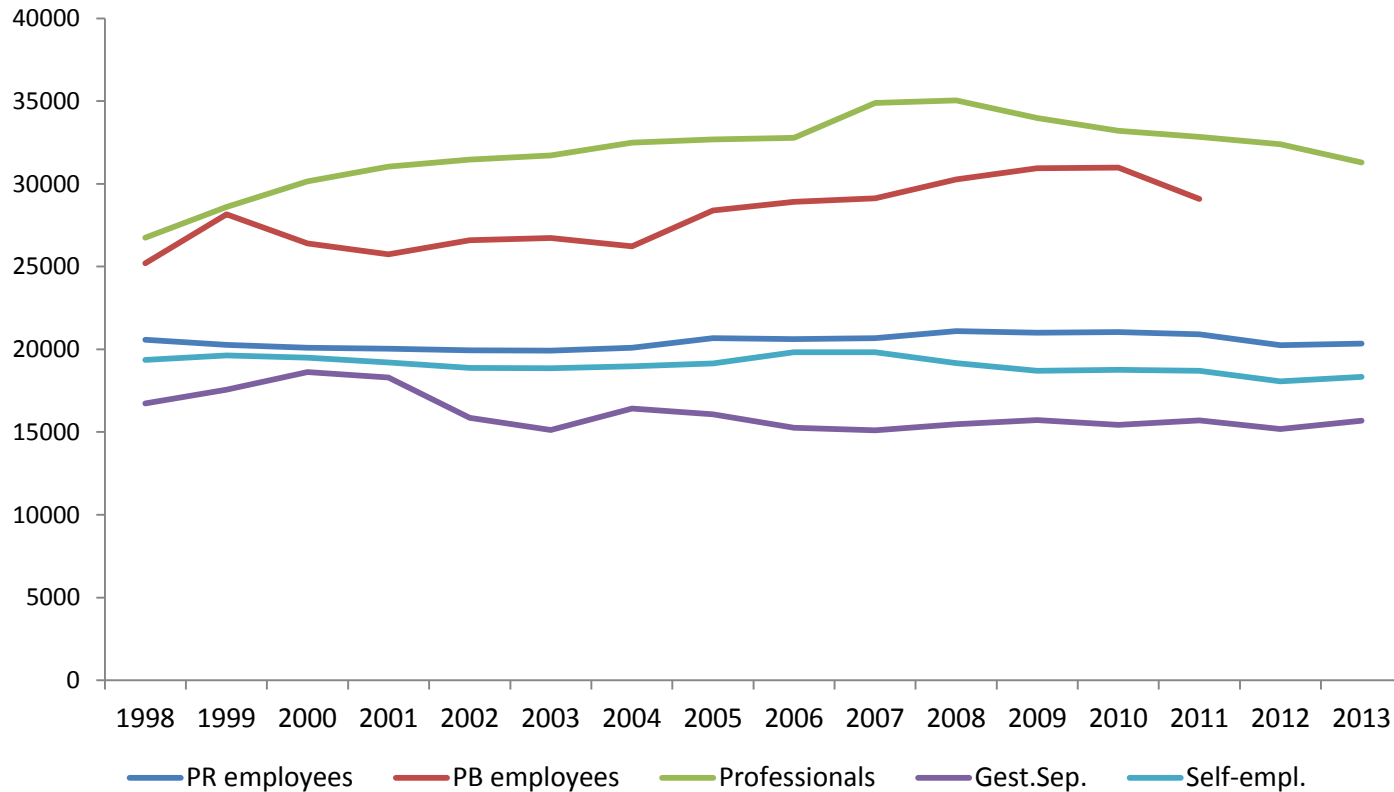
	Perm	Fixed term	Self-empl.	Atypical	Out of work
Perm	<b>91.0</b>	2.6	1.5	0.5	4.5
Fixed	36.9 ←	<b>40.6</b>	3.5	2.3	16.7 ↓
Self-empl.	2.8	1.6	<b>90.2</b>	1.0	4.4
Atypical	10.6	3.8	7.2	<b>67.8</b>	10.6

### Tertiary

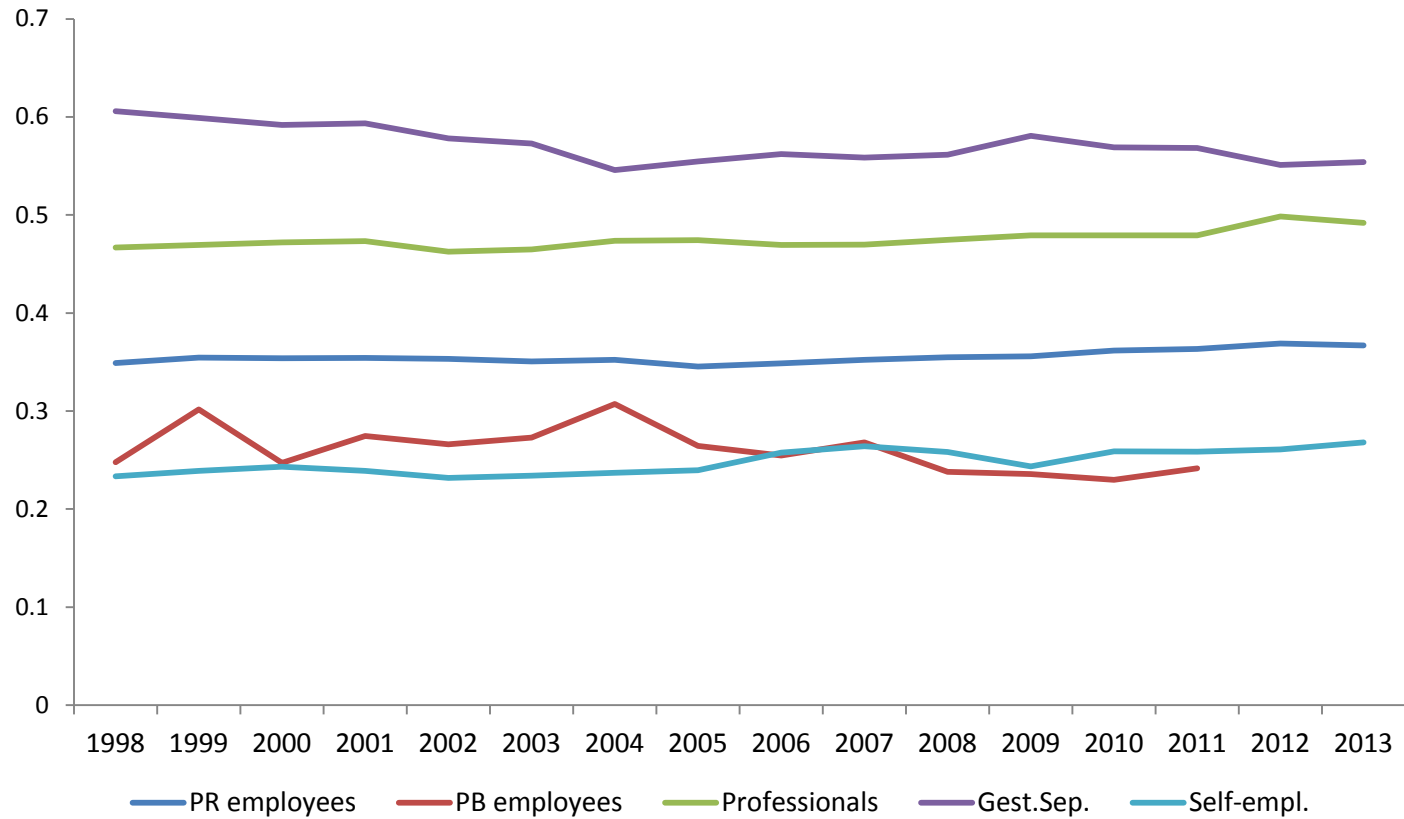
	Perm	Fixed term	Self-empl.	Atypical	Out of work
Perm	<b>93.4</b>	2.0	1.2	1.0	2.5
Fixed	37.1 ←	<b>41.1</b>	5.7	4.4	<b>11.8</b> ↓
Self-empl.	3.1	2.0	<b>92.2</b>	0.6	2.1
Atypical	12.6	6.7	4.5	<b>65.9</b>	10.3

# Labour earnings dynamics

## Trend of yearly gross earnings by work typology



## Trend of earnings inequality – Gini index

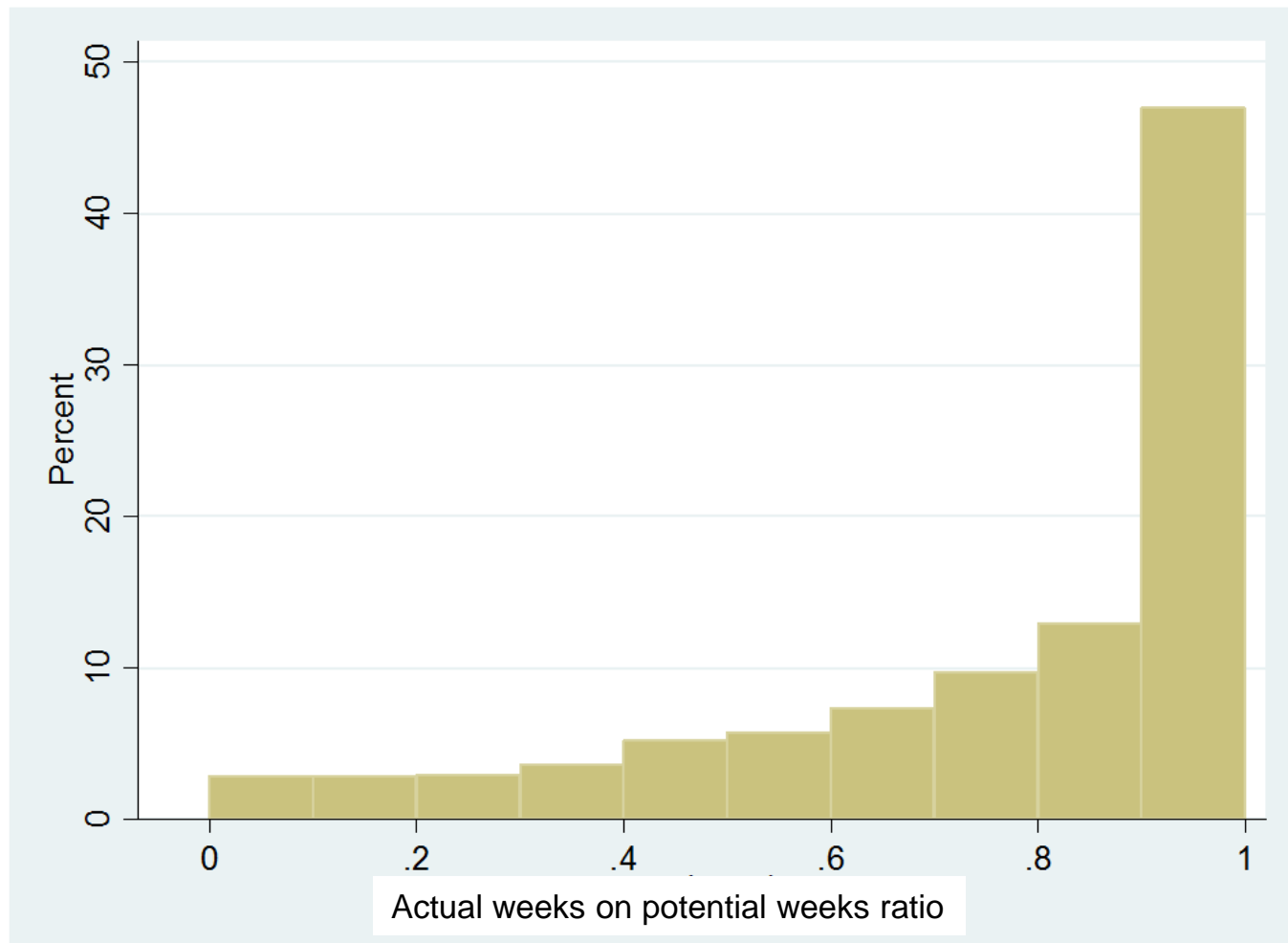


# Contributions accumulation for the first NDC cohorts

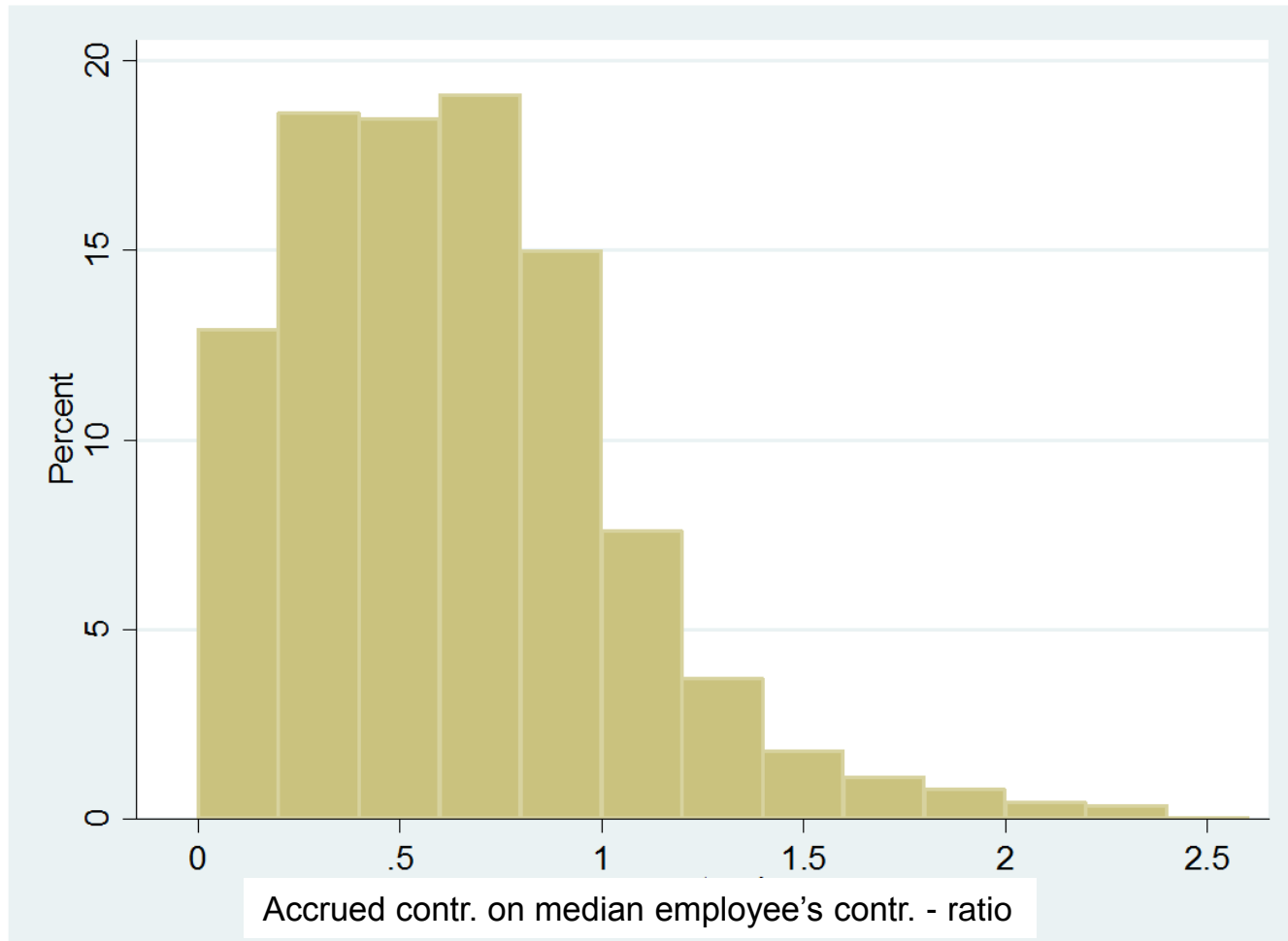
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- Focus on individuals having started to work in 1996-1998.
- Followed for 13 years (around 1/3 of the career).
- Accumulation adequacy assessed with respect to a representative individual working continuously as a full-time employee and earning the median wage (around 25,000 real gross annual Euros).

## Distribution of contribution weeks (wrt potential weeks)



## Relative distribution of contributions accumulation (wrt median employee)





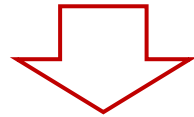
# Modelling the labour market dynamics in T-DYMM: features and simulation results

# LM transitions (1)

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- Conditional probabilities of LM transitions across employment states are estimated based on a **sequence of binary behavioural choices** with the following logical order:

1. Probability to be **employed** (all individuals who are not students nor retired are included in the regressions);



2. Probability to be **atypical worker** among all workers defined in step 1;



3. Probability to be an **employee** among workers defined in step 1 except atypical workers;



4. Probability to be **self-employed** (residual category );

# LM transitions (2)

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Among **employees** the subsequent choices are concerned:

1. Economic sector (**private vs public**);
2. Contract duration (**temporary vs permanent**);
3. Time arrangements (**part-time vs full-time**).

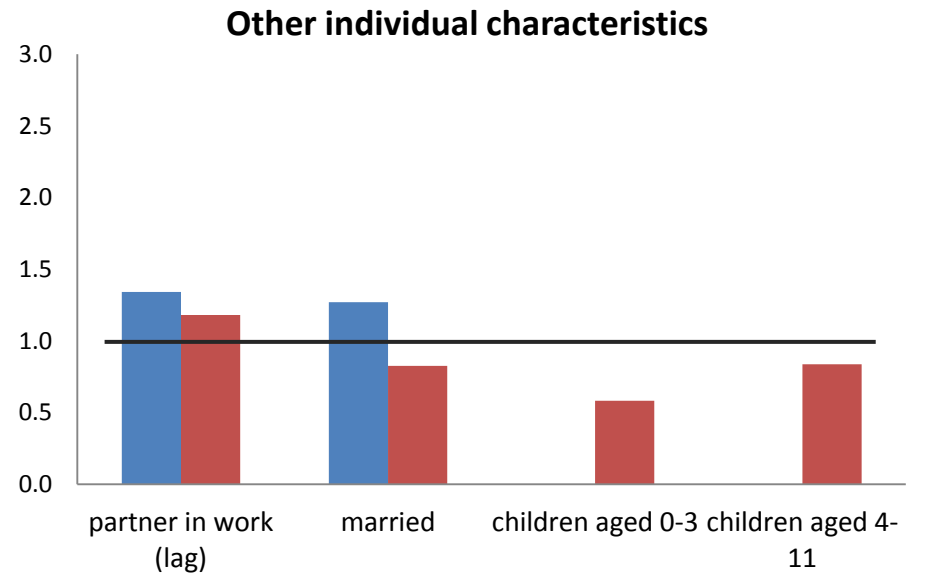
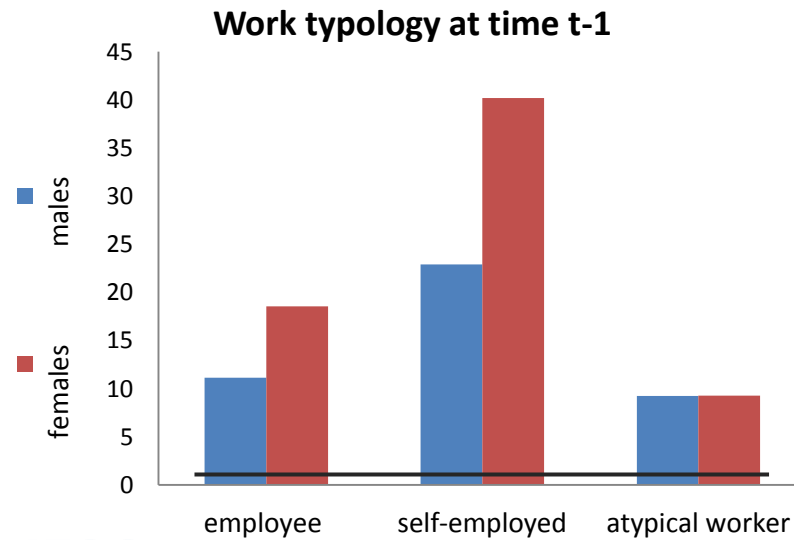
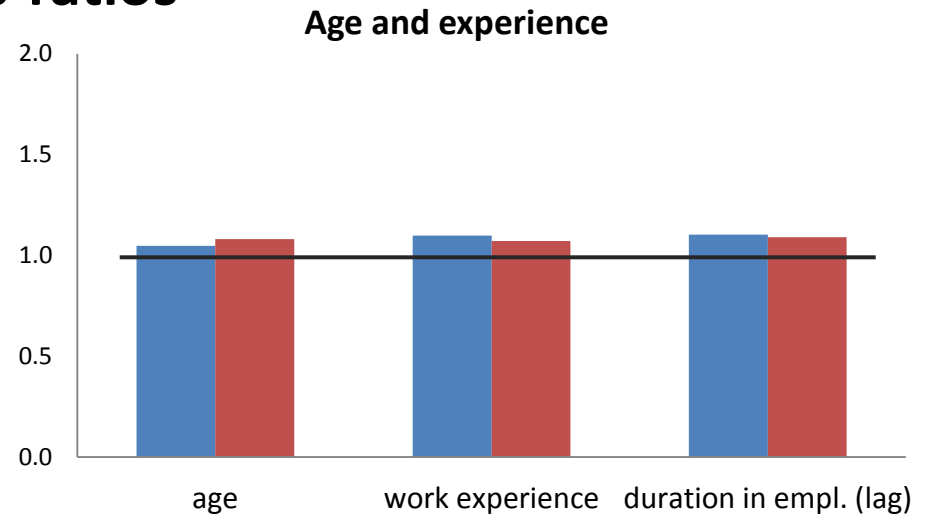
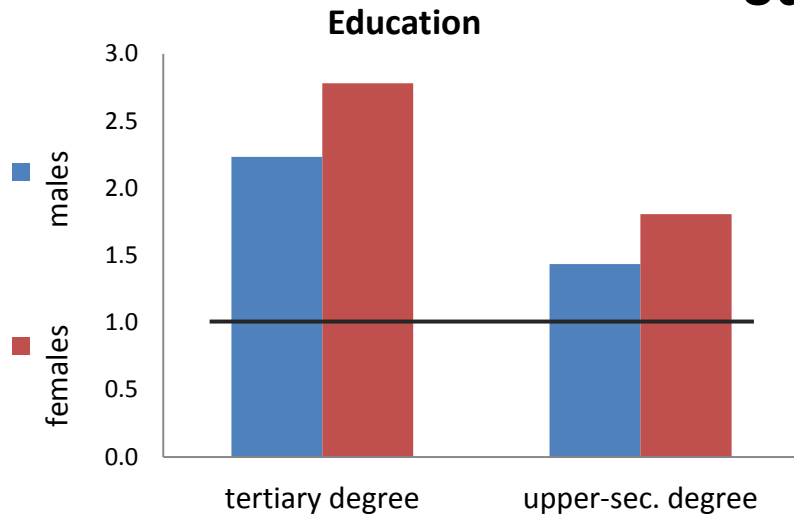
# LM transitions (3)

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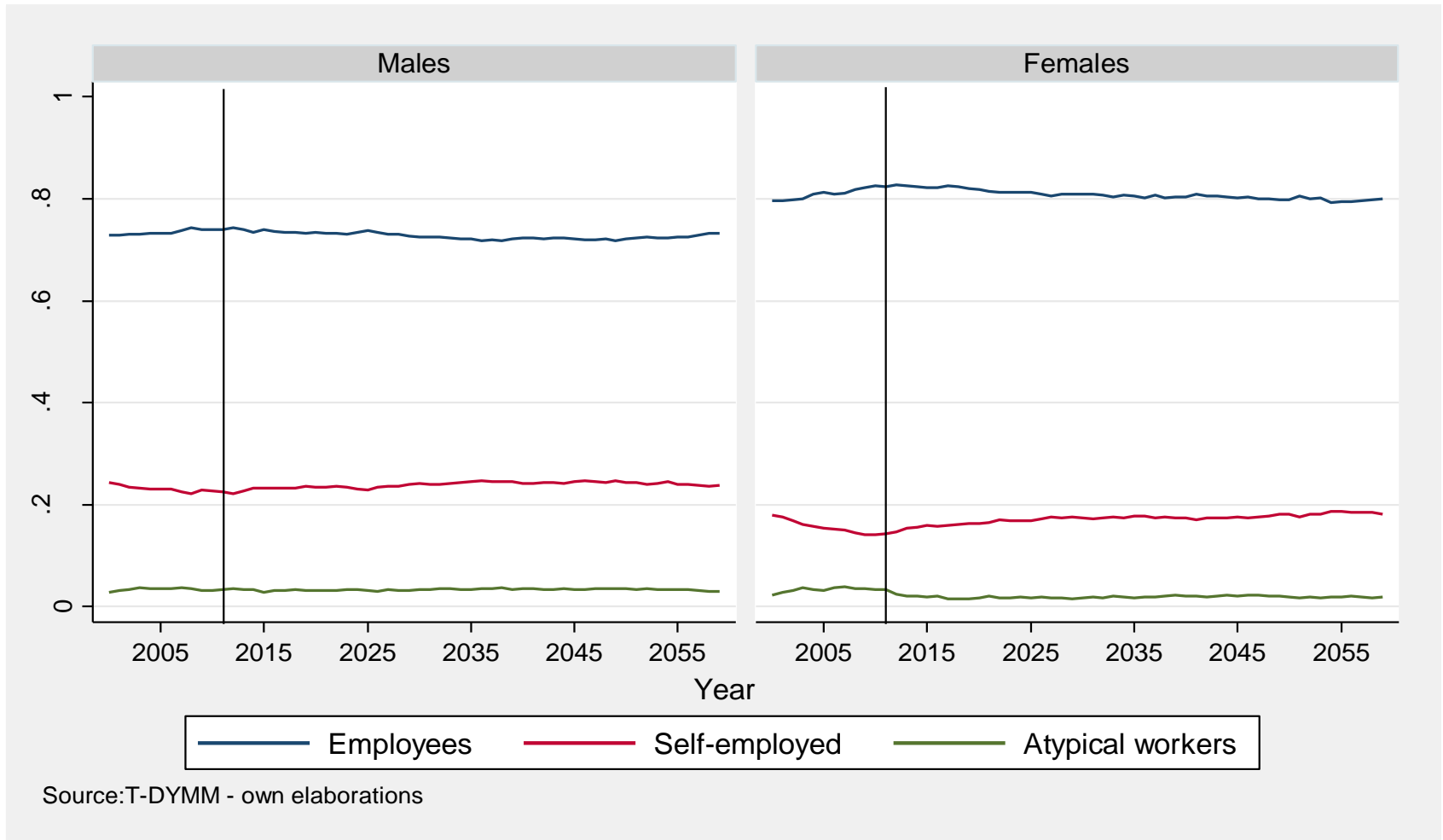
- Sample size: 1,105,456 observations, relative to 82,137 individuals aged 16-69 years old.
- Estimation period: 1998-2011.
- The estimations are carried out separately for **men** and **women**.
- **Random effect logit models** for LM transitions in order to account for individual unobserved heterogeneity.
- **Lagged labour states** are also included among the regressors.

**NB:** we do not include in our regressions any variable that is not present in the “simulation world” because of the impracticability of projecting its evolution in time.

# Prob. to be employed conditional on individual characteristics – odds-ratios



# Employment composition by work typology



# Estimations of earnings

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Yearly individual labour income gross of personal income taxation is the product of two components:

## monthly gross wages

The earnings process is modelled separately for the three work typologies and by gender

## months worked

Modelled in two steps:

- 1) The probability of being in work all year (concerns atypical and temporary workers)
- 2) Define the months worked for those workers who are not assigned to the «work all year» status

# Wage function

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- The WF consists of a vector of observed variables ( $\mathbf{X}_{it}$ ) and unobserved variables which are represented by a random component that captures heterogeneity in permanent differences between individuals ( $u_i$ ) and a stochastic error component ( $v_{it}$ ):

$$y_{it} = \mathbf{X}_{it}\boldsymbol{\beta} + u_i + v_{it}$$

- The permanent error component,  $u_i$ , (i.e. intellectual ability, soft skills, motivation) represents a constant wage deviation for each individual, where  $u \sim N(0, \sigma_u^2)$ .
- The transitory component,  $v_{it}$ , (i.e. bonuses, illness, overtime) follows an AR(1) process plus a white noise error,  $\varepsilon_{it}$ :

$$v_{it} = \rho v_{i,t-1} + \varepsilon_{it} \quad , \varepsilon \sim N(0, \sigma_\varepsilon^2) \text{ and } |\rho| < 1$$



# Estimations of monthly wages

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- A random effect GLS estimator has been utilised to estimate the wage equation on the AD-SILC panel data.
- Estimation period: 1998-2011
- The estimations are carried out separately for the three work categories and for men and women.
- Sample size: 632,762 observations for 79,009 individuals aged 20-60: about 75% are employees, 19,5% are self-employed and 5,5% are atypical workers.

# Estimations of months worked

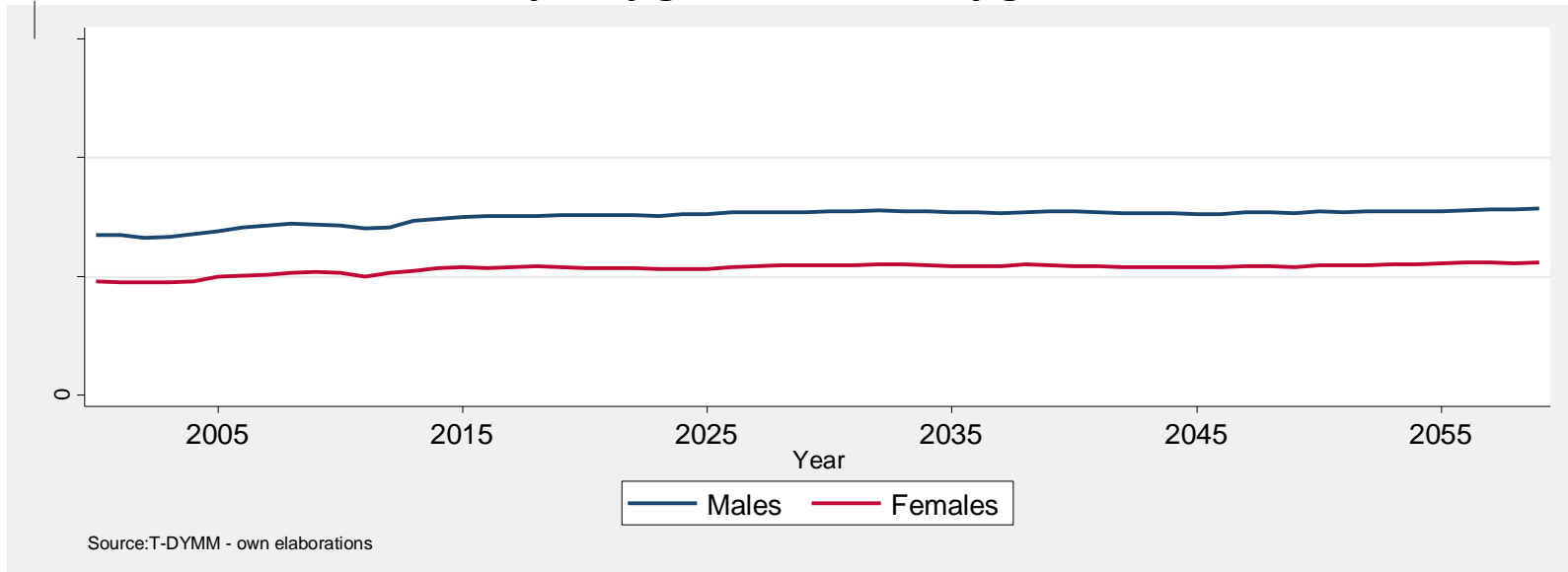
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1. Estimations of the probability of being in work all year:
  - Random Effect Logit model;
  - Sample size – 96,933 observations for 29,391 individuals: 48% are men and 52% are women;
  - Estimation period: 1998-2011.
2. Estimations of months worked:
  - Same model as for monthly wages;
  - Sample size– 50,264 observations for 12,768 individuals: 41% are men and 59% are women;
  - Estimation period: 1998-2011.

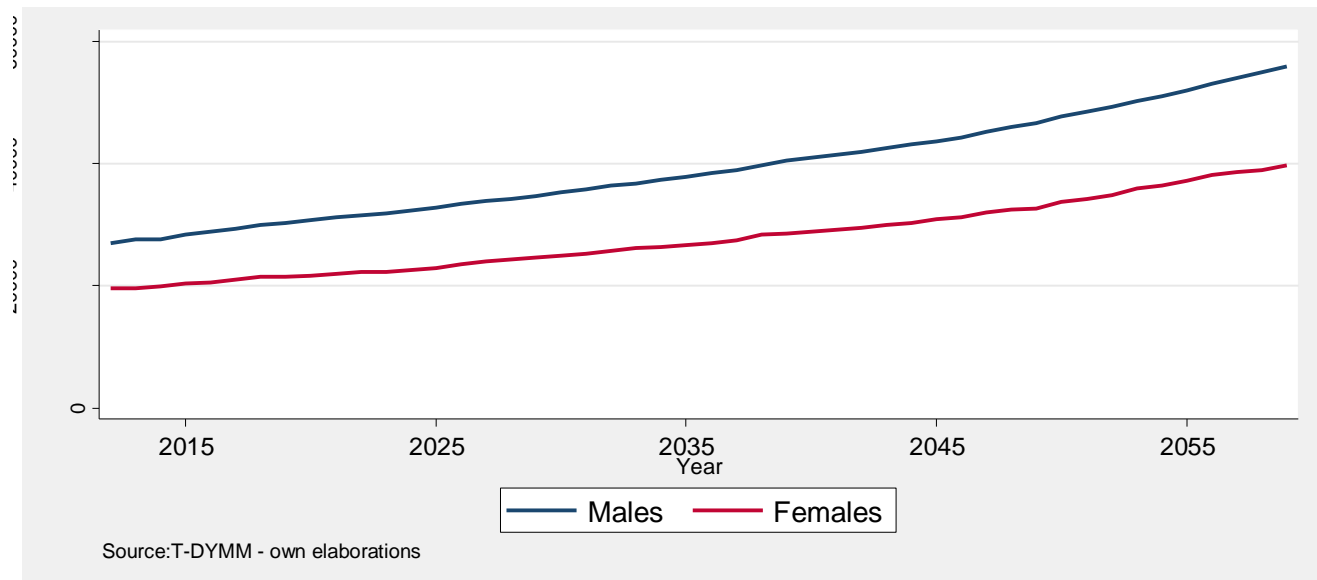
# Monthly wages of employees (estimation results)

	Males (1)		Females (2)	
	b	se	b	se
<i>tertiary degree</i>	0.545***	0.006	0.4411***	0.007
<i>upper-sec. degree</i>	0.2088***	0.004	0.2027***	0.005
<i>age</i>	0.0893***	0.003	0.0381***	0.005
<i>age<sup>2</sup></i>	-0.0022***	0	-0.0011***	0
<i>age<sup>3</sup></i>	0***	0	0***	0
<i>work experience</i>	0.0227***	0.001	0.0241***	0.001
<i>work experience<sup>2</sup></i>	-0.0003***	0	-0.0004***	0
<i>years as employee (lag)</i>	0.0082***	0	0.0113***	0
<i>perm. contract</i>			0.0508***	0.003
<i>perm. contract (lag)</i>	0.0137***	0.001	0.0371***	0.003
<i>part-time</i>	-0.3741***	0.003	-0.3225***	0.003
<i>part-time (lag)</i>	-0.0391***	0.003	-0.0645***	0.003
<i>public</i>	0.1118***	0.004	0.1057***	0.007
<i>public (lag)</i>	0.0109***	0.004	0.0977***	0.006
<i>in work (lag)</i>	0.0314***	0.002		
<i>married</i>	0.0098***	0.002	-0.0281***	0.004
<i>partner in work</i>	0.0055***	0.002		
<i>children aged 0-3</i>			-0.1881***	0.003
<i>constant</i>	5.9656***	0.038	6.482***	0.066
$\sigma_u$	0.2812		0.2974	
$\sigma_v$	0.1719		0.3242	
$\rho$	0.4638		0.2878	
<i>R<sup>2</sup>-within</i>	0.1955		0.122	
<i>R<sup>2</sup>-between</i>	0.4704		0.4902	
<i>R<sup>2</sup>-overall</i>	0.3998		0.3837	
<i>N.obs.</i>	272,072		217,742	

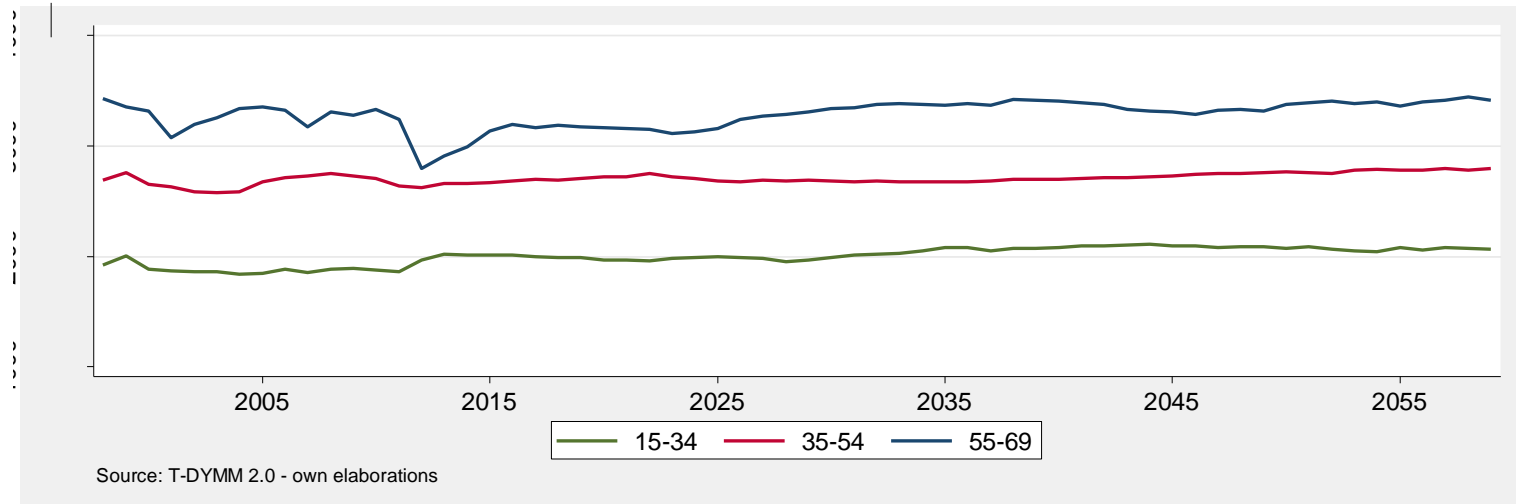
## Trend of yearly gross incomes by gender



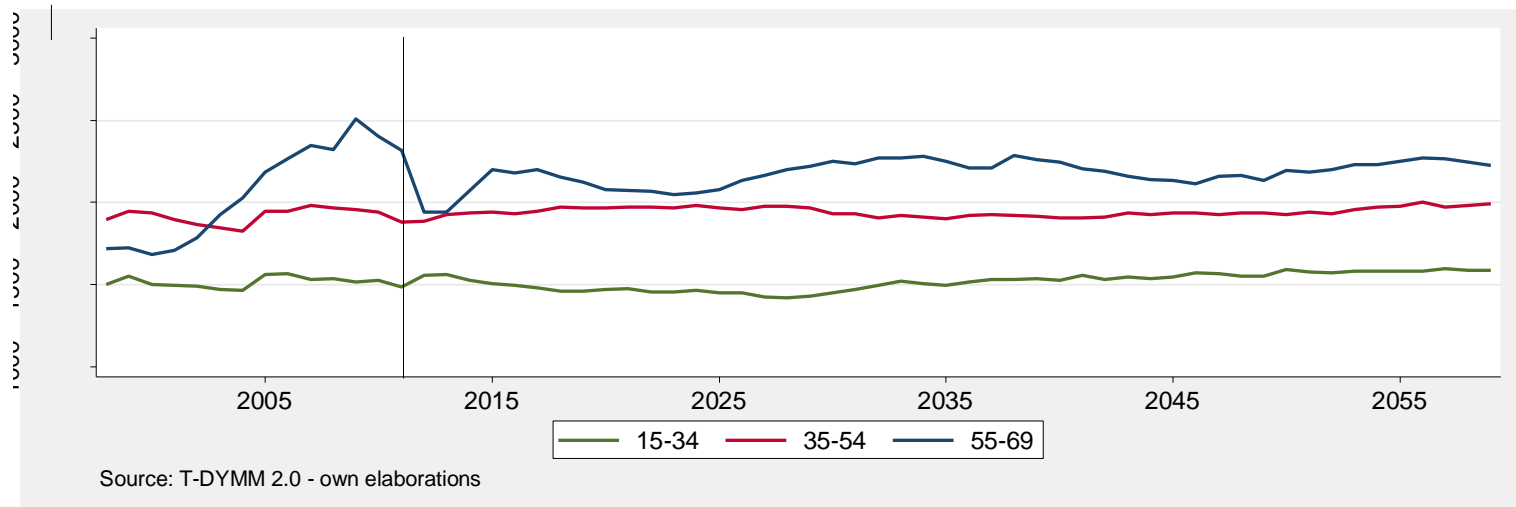
## Trend of yearly gross incomes by gender (with GDP growth)



## Trend of monthly wages of employees (males)



## Trend of monthly wages of employees (females)



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