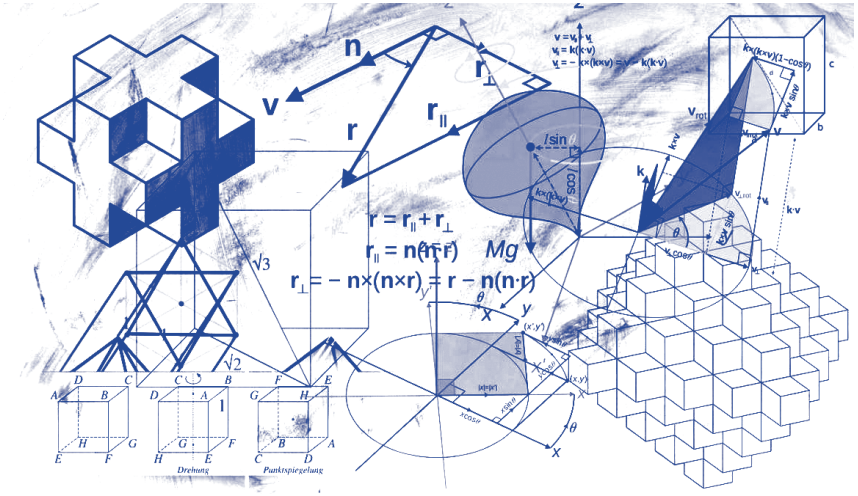
SECOND INTERNATIONAL WORKSHOP - MOSPI PROJECT

The Treasury DYnamic Microsimulation Model (T-DYMM): structure, preliminary results and future implementations

PANEL 2

Labor Market and Wealth

Presenters: Chiara Puccioni, Elena Fabrizi, Michele Bavaro
Discussants: Giovanni Gallo, Paolo Acciari, Federico Belotti



With financial support from the European Union – EaSI Progress Program

Outline

- General features & novelties
- Data
- Evidence from Italian labor market
- Econometric models & estimates results
- Future implementations

Novelties

- Allowing retired and students to work. After being assigned to work status, retired workers labour market transitions and monthly wages are estimated separately

- Multinomial model to estimate transitions

- New evidences of interesting labor market phenomena from the estimates, not highlighted in previous report

The Labor market dataset

DATASET

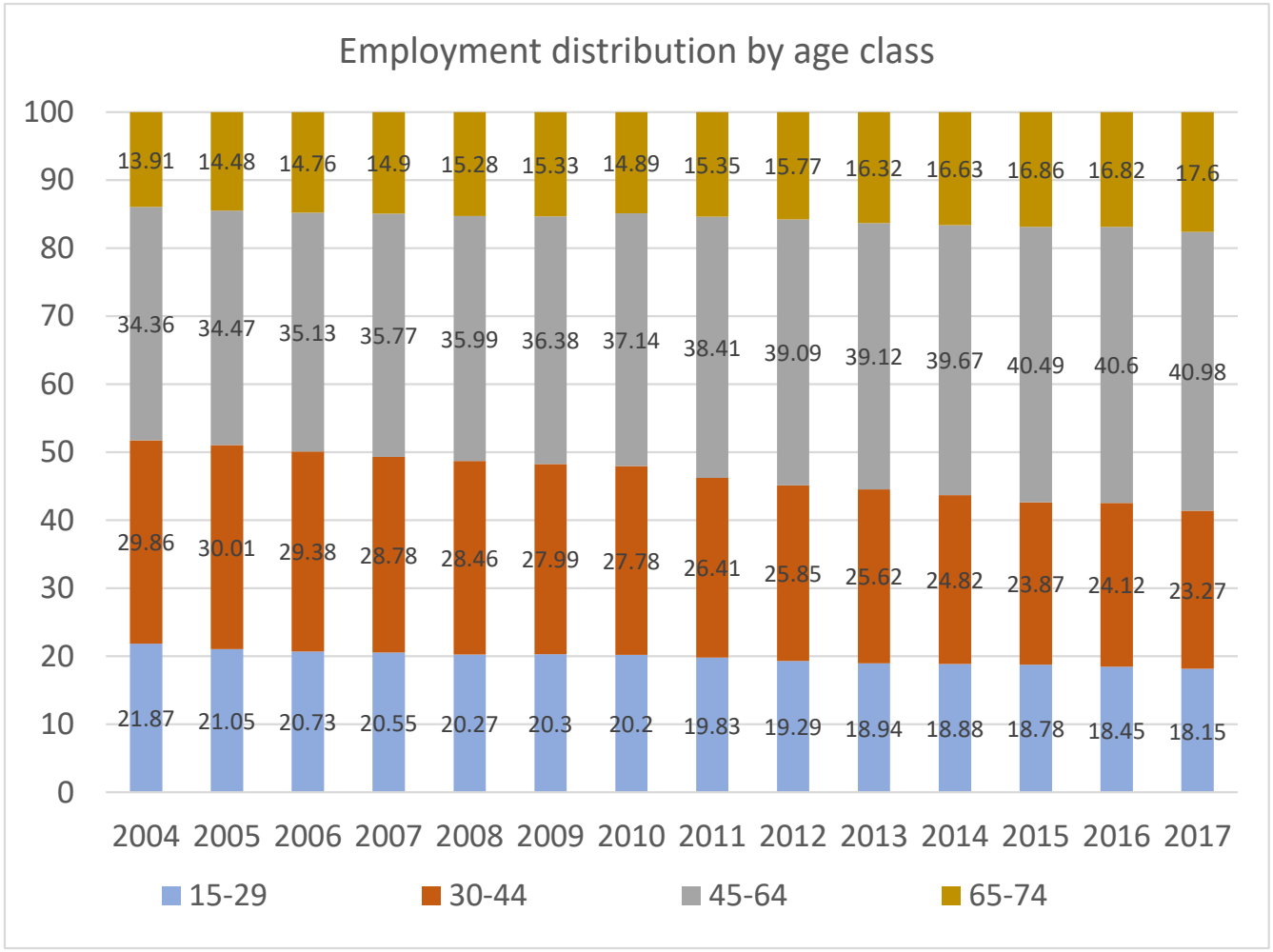
AD-SILC is an unbalanced panel with retrospective (forward-looking) information on individuals' working conditions before (after) the year of survey of SILC, based on:

- ✓ 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.

SAMPLE DESCRIPTION

- Sample size : 551,682 observations and 211,555 individuals aged 15-80
- Time span: unbalanced panel data from 2004 to 2017, individual appear 2.6 times on average
- Demographic and socio-economic individual or household characteristics such as country of birth, marital status, age, nr of children, disability status etc. from SILC and labour market-related information from INPS

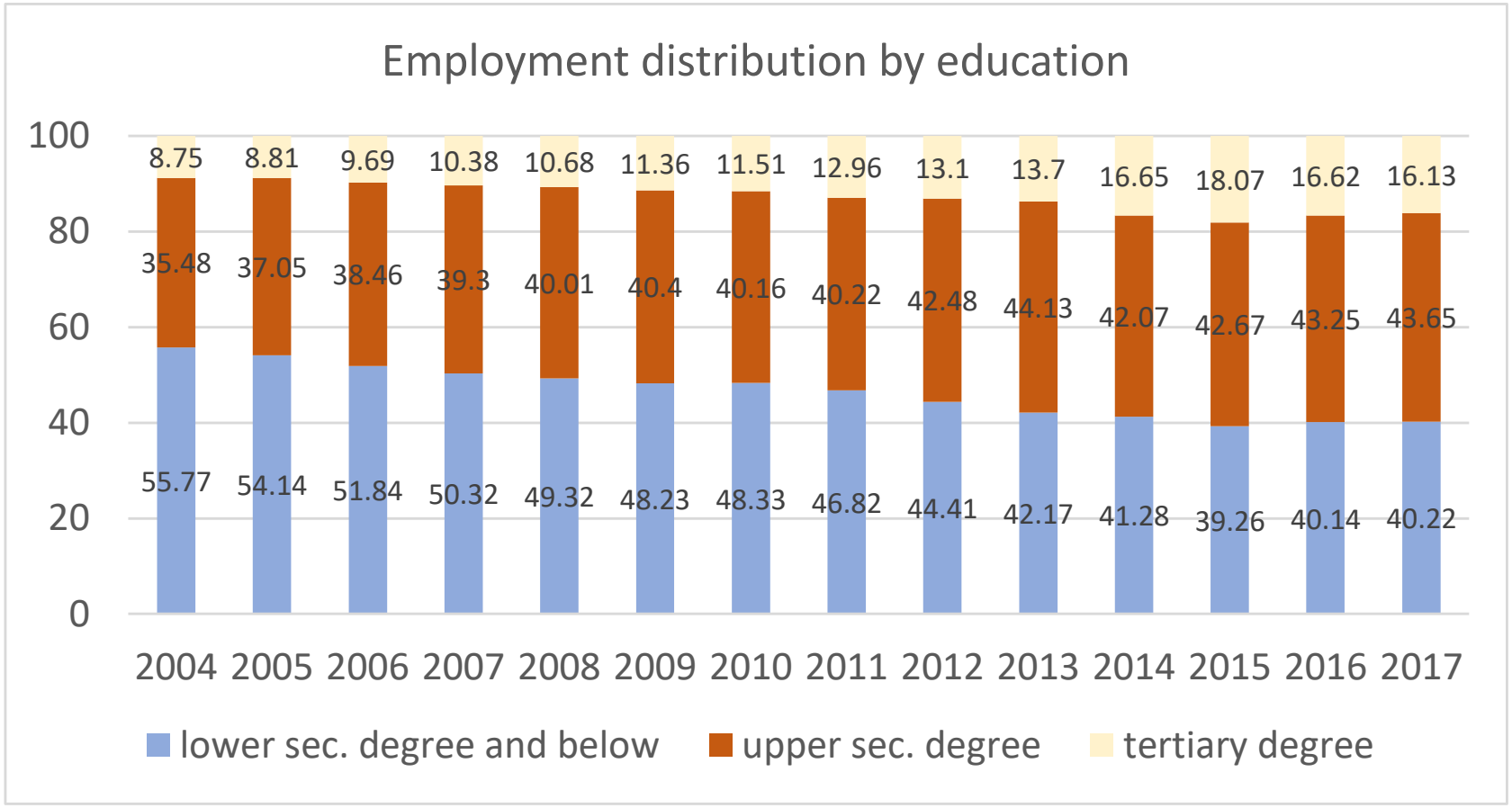
The Italian Labor Market over 2004-2017



Overtime workforce is continuously ageing and therefore changing.

Elaboration on AD-SILC , 2004-2017

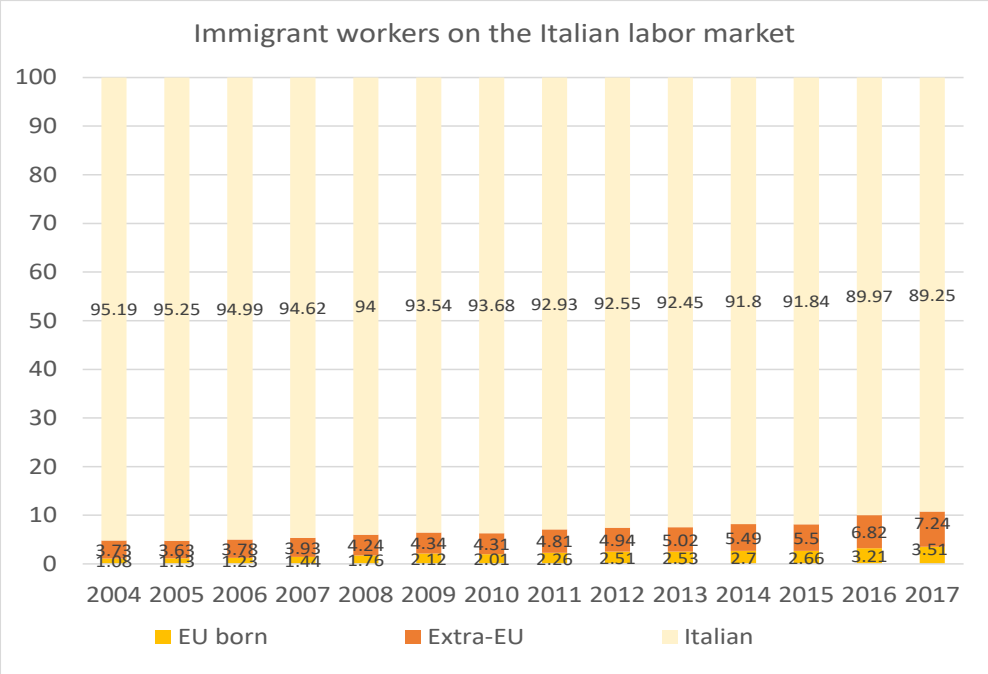
The Italian Labor Market over 2004-2017



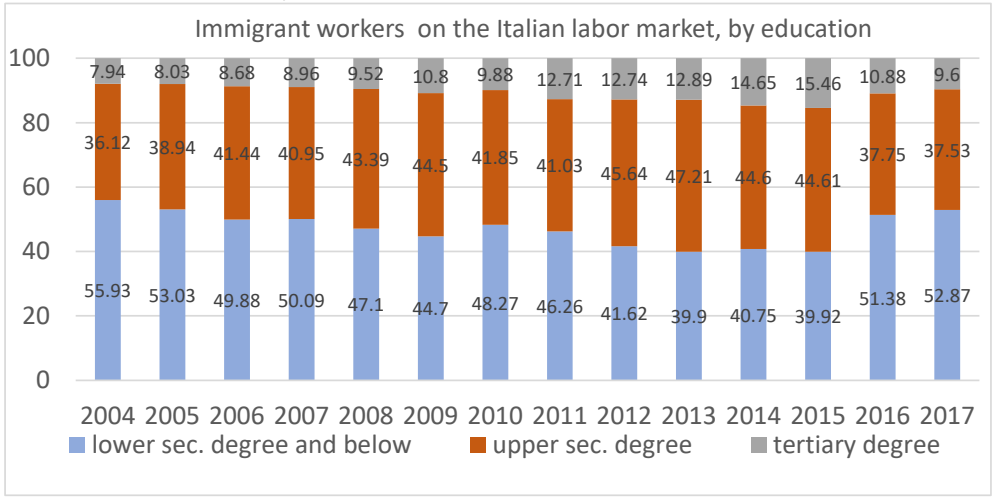
Elaboration on AD-SILC , 2004-2017

Decrease of the share of workers with a lower secondary degree at most, consequently favoring the component with the highest educational qualification

The Italian Labor Market over 2004-2017



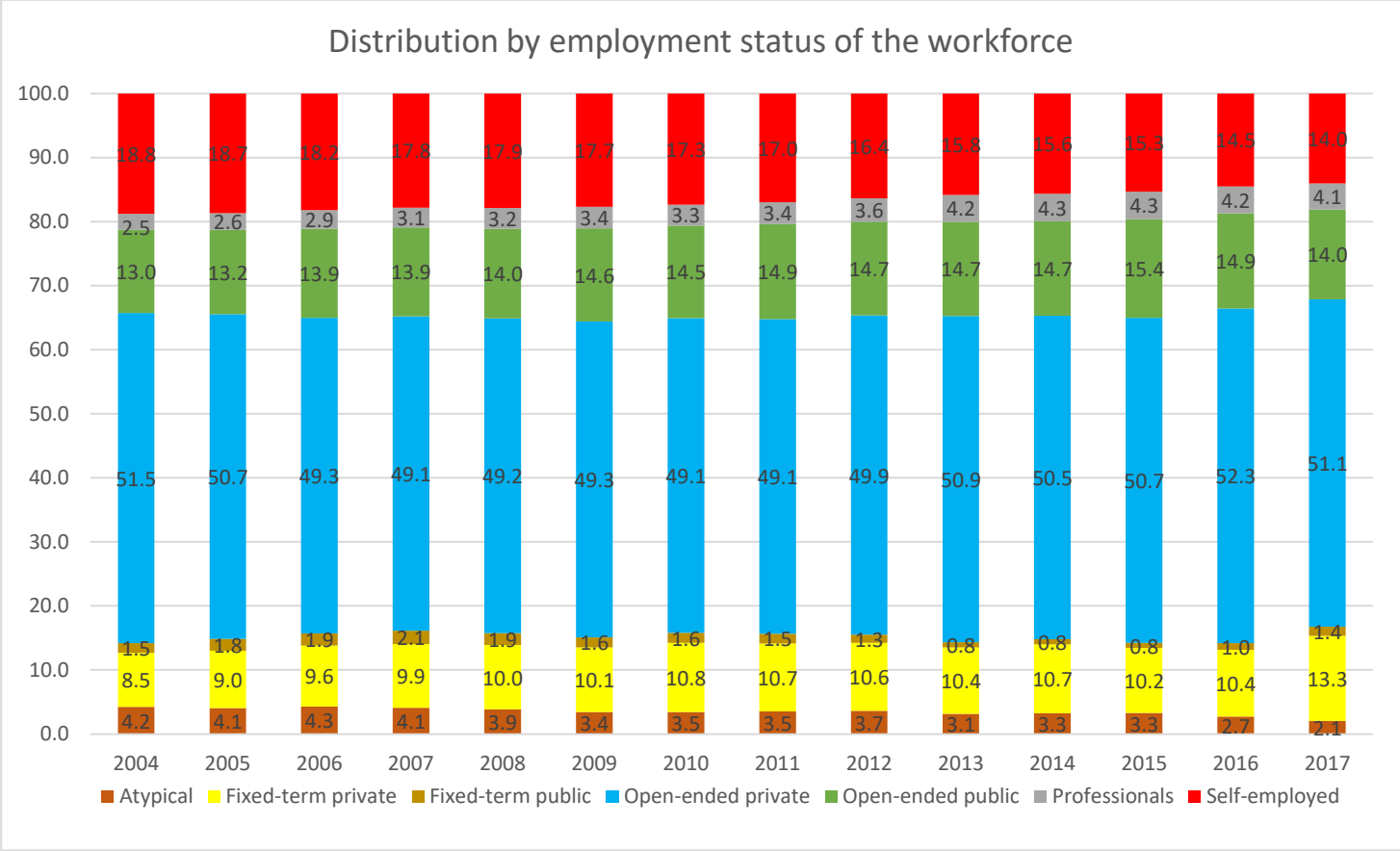
Elaboration on AD-SILC , 2004-2017



The immigrant workforce share gradually rose

Immigrant influx tend to be more educated over time

The Italian Labor Market over 2004-2017

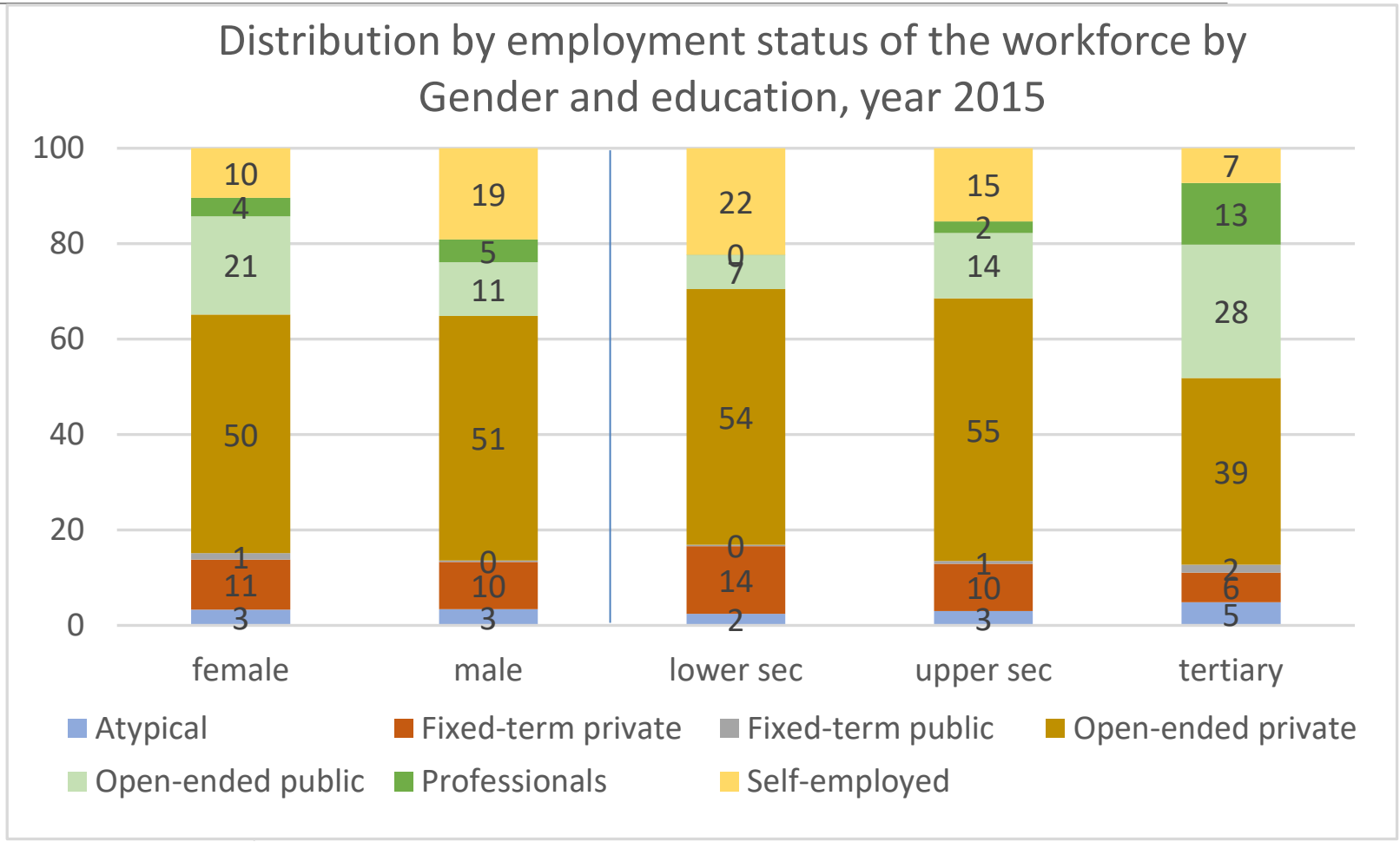


Elaboration on AD-SILC , 2004-2017

over time:

Growth in fixed-term positions; reduction of self-employed and slight surge in Professionals

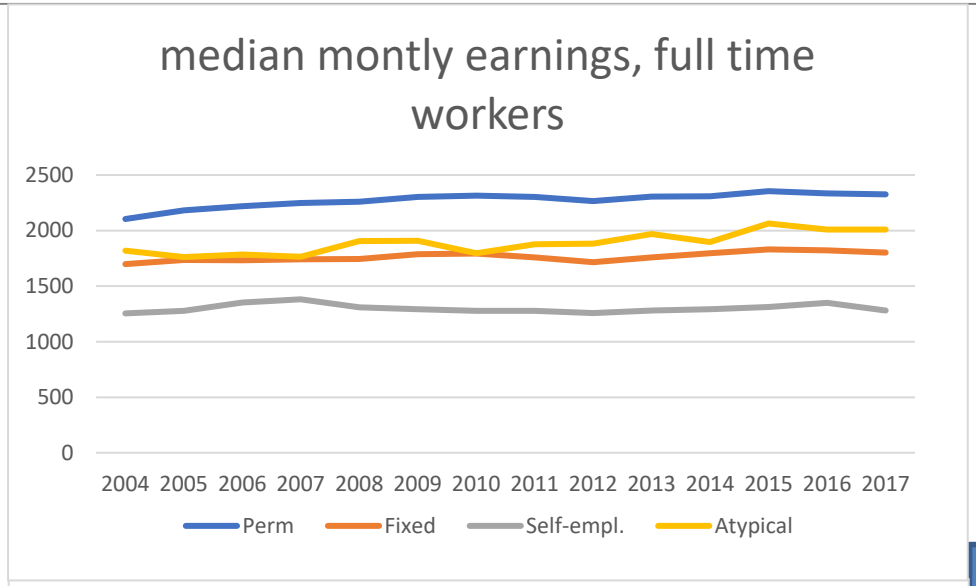
The Italian Labor Market over 2004-2017

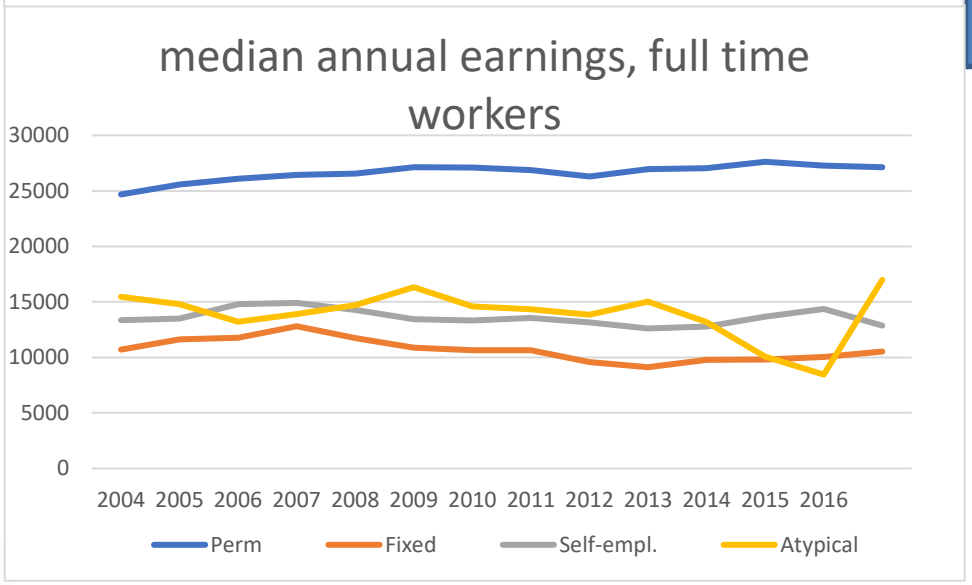


Among males higher self-employment occurred, compensated by a lower amount of public positions.

Workforce with tertiary education is more frequent having an open-ended contract in public or Professional fields, in comparison to those with lower education.

Evidence from labor earnings dynamics

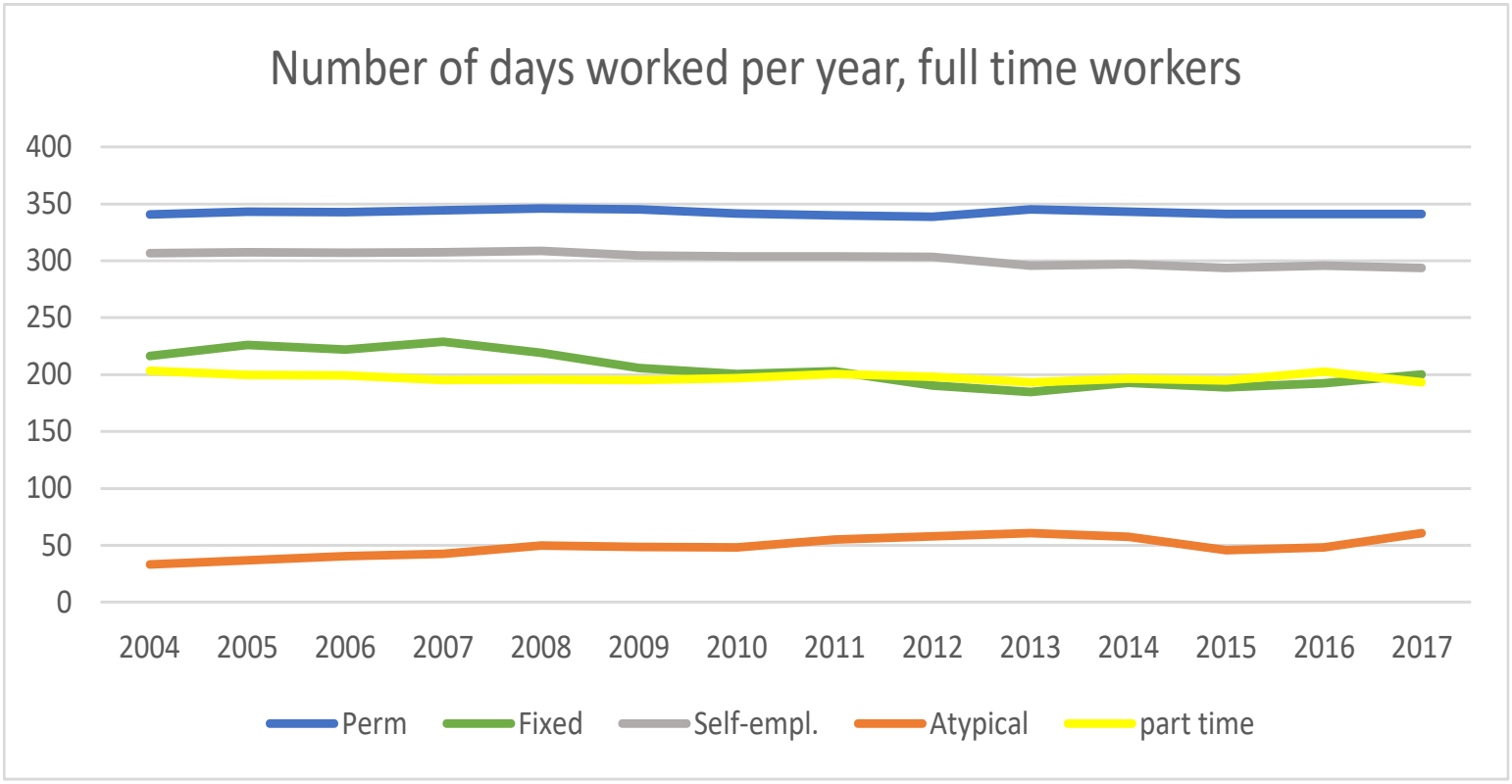




Comparing annual and monthly evidence on earnings, it is very clear that earning inequality strictly depends on duration aspects

Elaboration on AD-SILC , 2004-2017

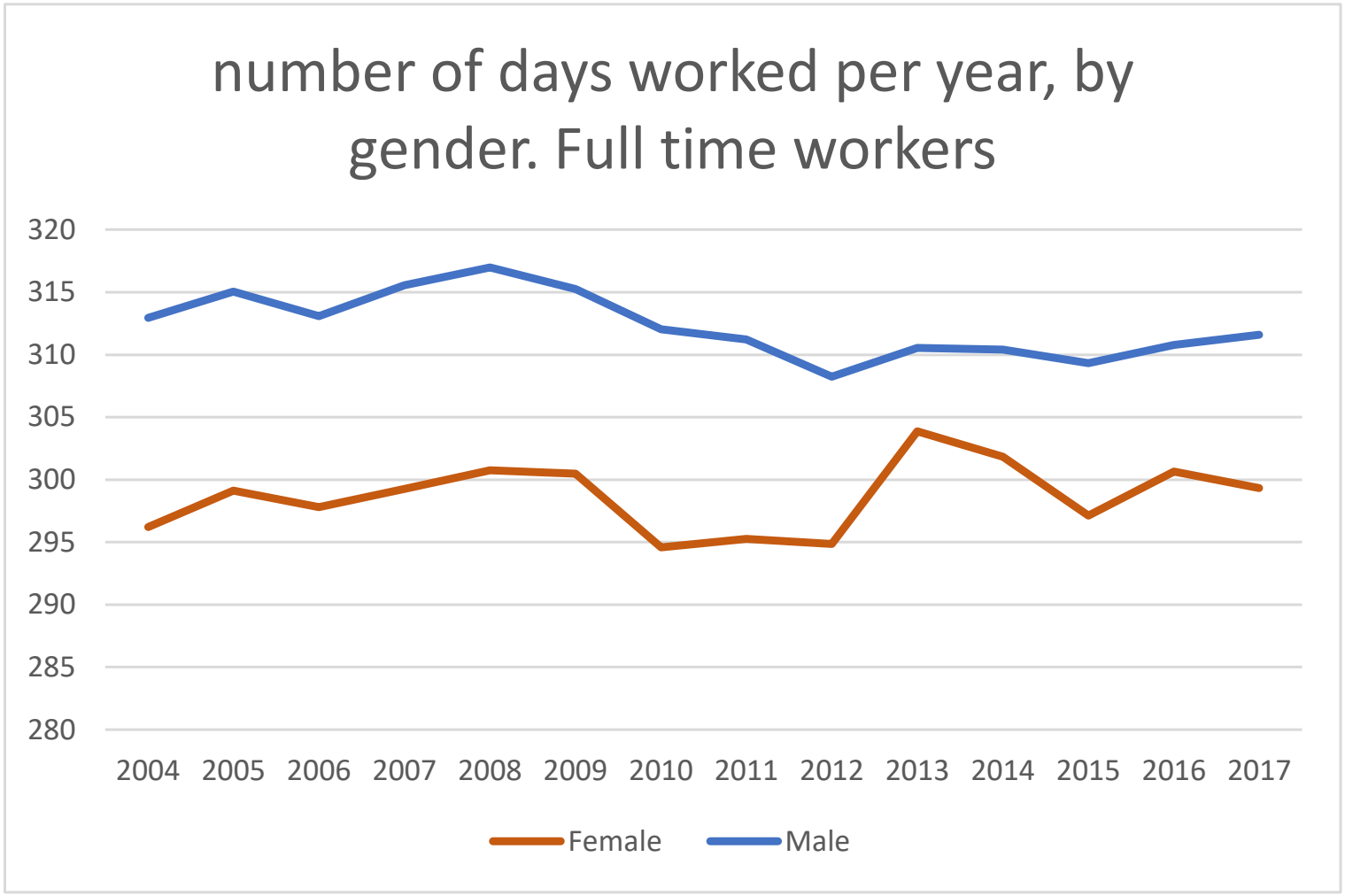
Evidence from intensity of work



Elaboration on AD-SILC , 2004-2017

Differences in the number of work days therefore differences in earnings

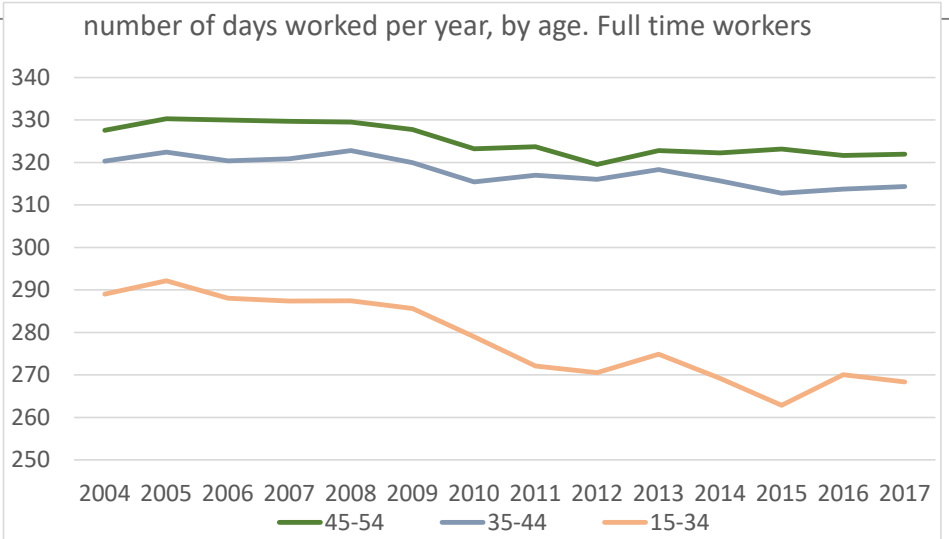
Evidence from intensity of work

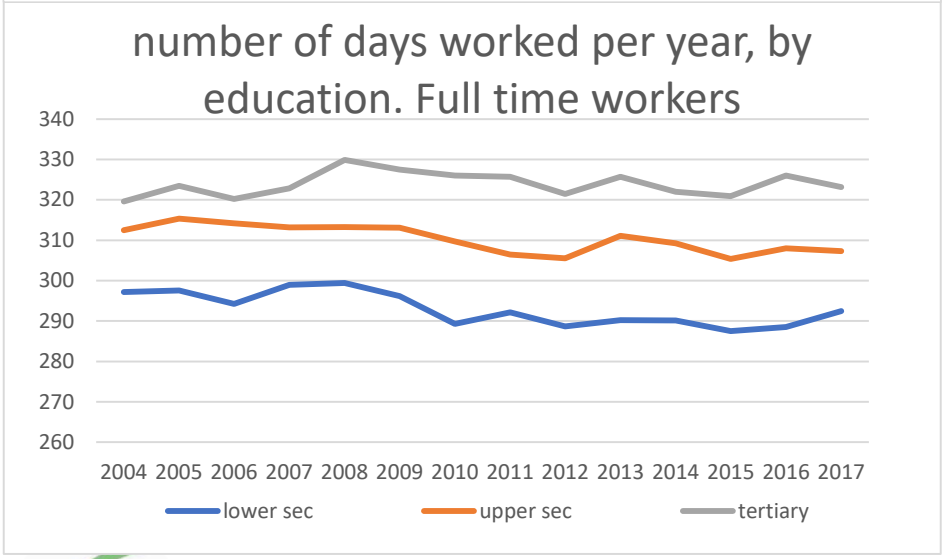


Elaboration on AD-SILC , 2004-2017

Strong differences are observed between the gender work days

Evidence from intensity of work



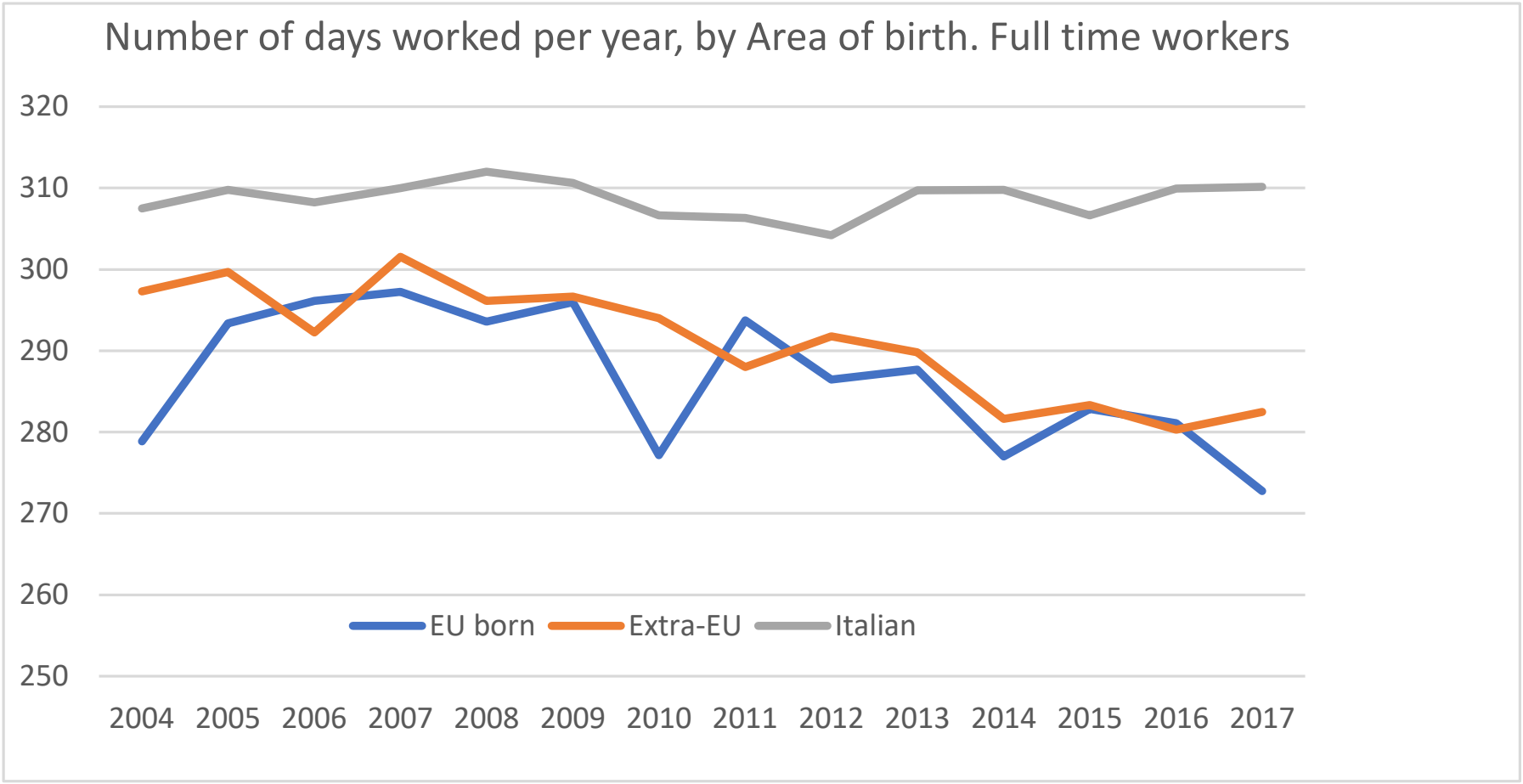


Elaboration on AD-SILC , 2004-2017

Work days are dramatically different concerning the age and the educational aspect .

The gap between the youngest and the rest of the working population increases over time.

Evidence from intensity of work



Elaboration on AD-SILC , 2004-2017

Concerning work intensity immigrant workforce is penalized with respect to native workers.

Labor market transitions

Transition matrix: working conditions after 1 year

	2006				
2005	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	92.5	2.5	0.7	0.4	4.0
Fixed	21.7	66.7	1.3	1.5	8.7
Self-empl.	1.2	0.7	92.3	0.9	5.0
Atypical	7.1	6.0	5.0	72.2	9.8

	2016				
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	92.6	2.1	0.4	0.2	4.8
Fixed	22.2	62.7	0.5	1.5	13.1
Self-empl.	2.2	0.6	91.6	0.5	5.1
Atypical	14.3	9.3	3.5	53.3	19.6

Elaboration on AD-SILC , 2004-2017

Over time, an increasing number of workers downgrade to an «out of work» state

Labor market transitions

Transition matrix: working conditions after 2 years

			2007		
2005	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	88.0	3.7	1.4	0.5	6.3
Fixed	32.0	52.1	2.3	1.6	12.0
Self-empl.	2.5	1.4	86.6	1.5	8.1
Atypical	13.9	8.3	5.8	55.8	16.2

			2017		
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	86.9	4.0	0.7	0.1	8.3
Fixed	28.6	54.7	1.1	0.7	14.9
Self-empl.	3.4	1.8	85.7	0.7	8.4
Atypical	15.6	14.8	4.1	41.5	24.0

Elaboration on AD-SILC , 2004-2017

After two years, the number of workers observed in an «out of work» state particularly concerns the precarious individuals.

Labor market transitions

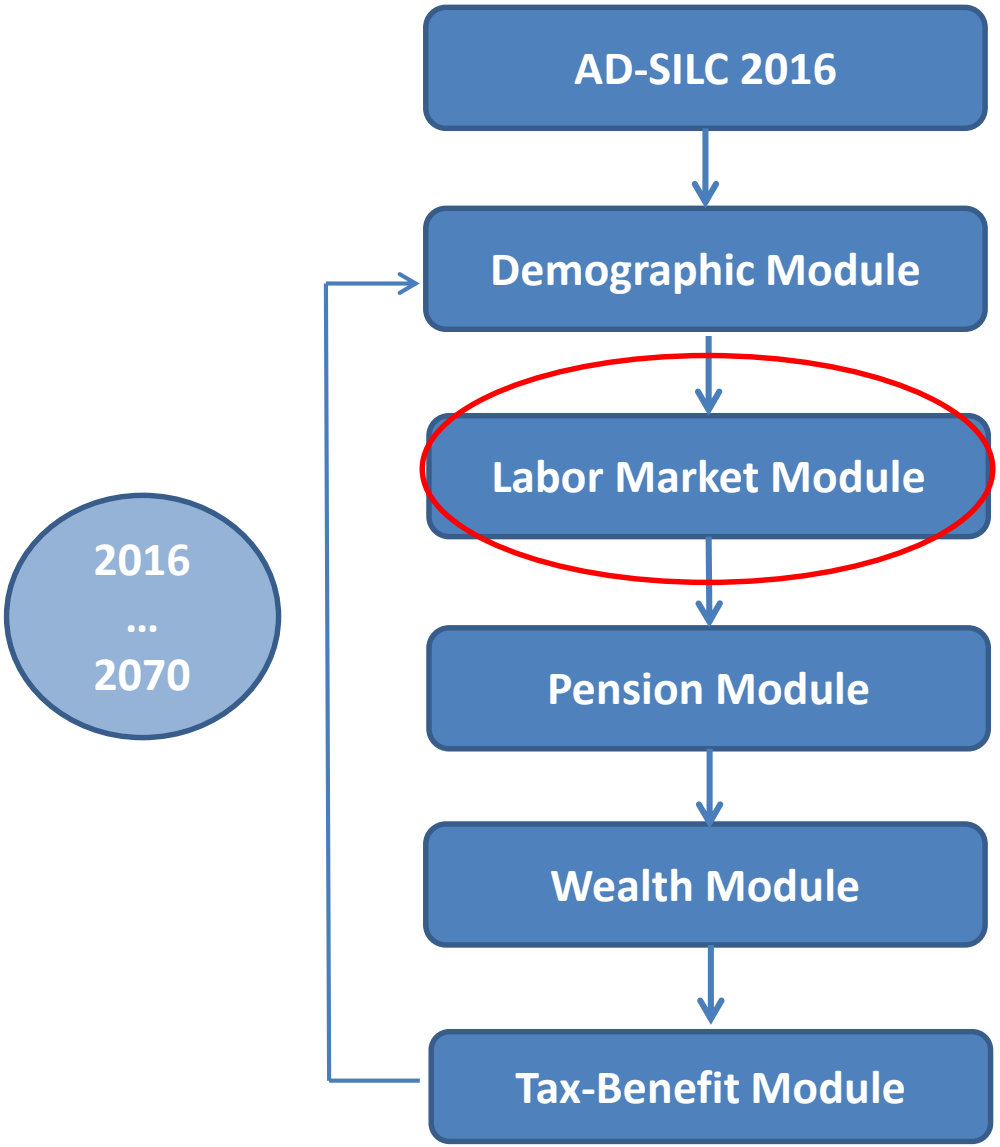
Transition matrix: working conditions after 2 years, by education

At most lower-secondary					
	2017				
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	83.0	4.8	0.6	0.0	11.5
Fixed	21.7	59.0	0.3	0.3	18.7
Self-empl.	2.2	1.6	84.3	0.4	11.5
Atypical	9.8	16.7	2.9	30.4	40.2
Upper-secondary					
	2017				
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	86.8	4.2	0.8	0.2	8.1
Fixed	29.3	55.4	1.2	0.3	13.8
Self-empl.	3.3	1.9	85.7	0.5	8.5
Atypical	15.3	15.3	2.6	42.4	24.5
Tertiary					
	2017				
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	91.1	2.8	0.8	0.1	5.3
Fixed	41.0	43.9	2.3	2.6	10.3
Self-empl.	5.2	1.9	87.2	1.2	4.5
Atypical	19.2	13.2	6.6	46.7	14.3

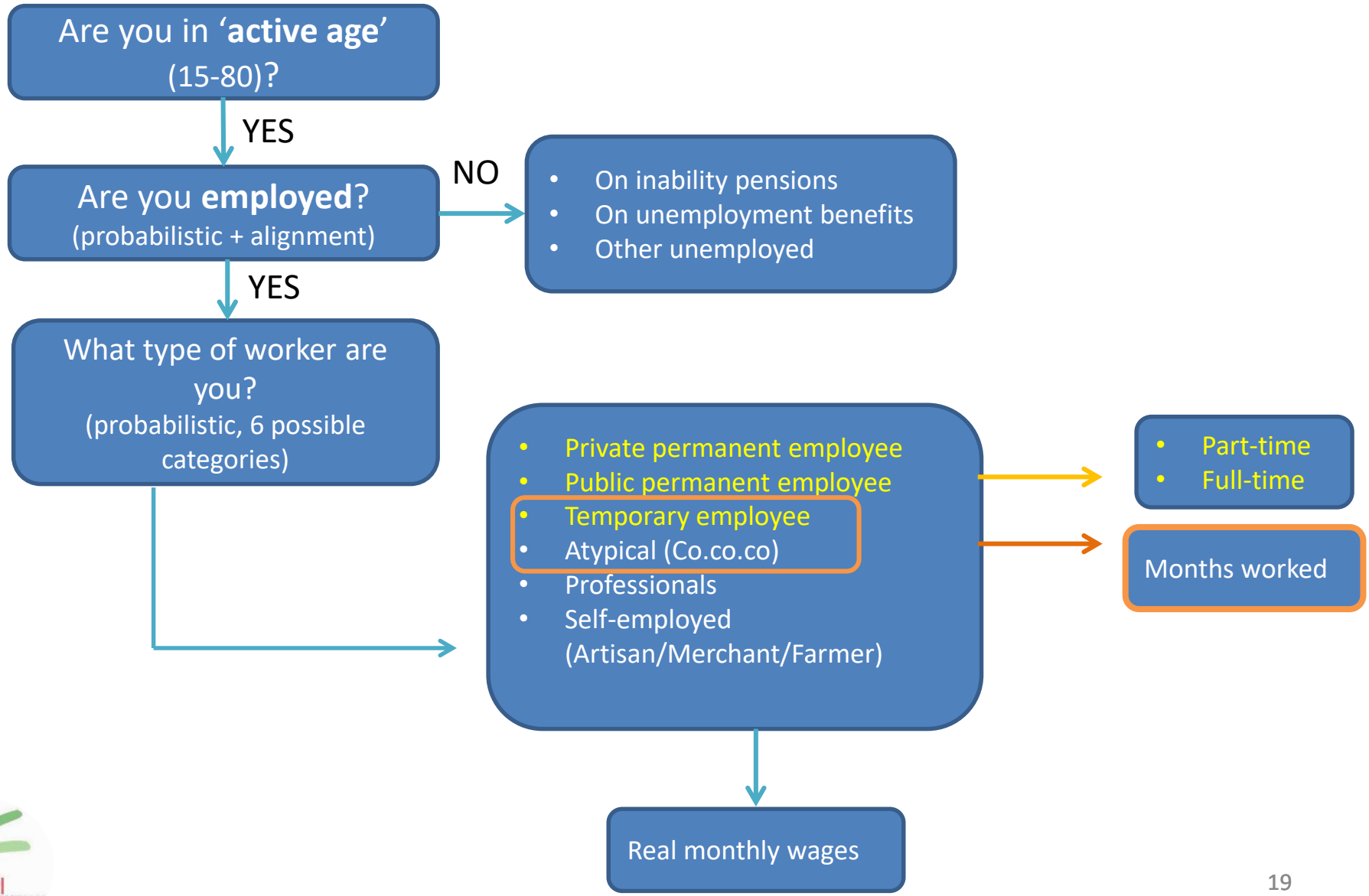
Elaboration on AD-SILC , 2004-2017

Workforce with a tertiary degree is more protected from the risk of falling in a jobless condition.

The Modules of T-DYMM



General features of Labor Market Module



Probability of being employed by sex, log odds

	Male		Female	
	b	se	b	se
Socio-demographic				
Extra-EU born	0.264***	(0.041)	0.186***	(0.038)
studying	-1.050***	(0.033)	-1.043***	(0.033)
retired	-2.291***	(0.047)	-1.926***	(0.061)
children aged 0-6			-0.319***	(0.029)
disabled	-0.340***	(0.052)	-0.303***	(0.057)
inability pension	-1.123***	(0.096)	-1.092***	(0.093)
disability allowance	-0.982***	(0.120)	-0.870***	(0.126)
invalidity pension	-1.241***	(0.088)	-1.358***	(0.145)
age	0.372***	(0.012)	0.070***	(0.005)
age^2	-0.009***	(0.000)	-0.001***	(0.000)
age^3	0.000***	(0.000)		
upper sec. degree	0.260***	(0.020)	0.399***	(0.021)
tertiary degree	0.584***	(0.032)	0.855***	(0.031)
in couple	0.152***	(0.027)	-0.289***	(0.033)
partner working(lag)	0.178***	(0.027)	0.138***	(0.030)
Labor market related				
experience	0.044***	(0.002)	0.045***	(0.002)
duration in last spell if out-of-work	-0.193***	(0.007)	-0.190***	(0.006)
duration in last spell if working	0.022***	(0.001)	0.021***	(0.002)
open-ended private(lag)	3.530***	(0.032)	3.858***	(0.034)
fixed-term private(lag)	2.830***	(0.037)	3.163***	(0.038)
open-ended public(lag)	3.820***	(0.055)	4.723***	(0.060)
fixed-term public(lag)	2.997***	(0.124)	3.675***	(0.083)
professionals(lag)	4.681***	(0.110)	4.328***	(0.126)
self-employed(lag)	4.110***	(0.051)	4.545***	(0.065)
atypical(lag)	3.601***	(0.071)	3.194***	(0.068)
Constant	-5.650***	(0.161)	-2.370***	(0.099)
ROC	0.723		0.738	
pseudo-R^2	0.974		0.977	
Nr of obs	253370		250303	

AD-SILC , 2004-2017, all individuals aged 15-80

Multinomial logit (ref. category: open-ended private), male, log odds

	Opend_ended_public		Fixed_term		Professional		Self_employed		Atypical	
	b	se	b	se	b	se	b	se	b	se
EU born	-1.736***	(0.273)	-0.229***	(0.085)	-1.350***	(0.352)	-0.195	(0.124)	-0.467**	(0.232)
Extra-EU born	-1.610***	(0.219)	-0.230***	(0.053)	-1.319***	(0.247)	-0.282***	(0.075)	-0.854***	(0.147)
studying	0.167	(0.129)	0.712***	(0.050)	0.043	(0.141)	-0.210***	(0.082)	1.281***	(0.092)
age	0.237***	(0.034)	-0.087***	(0.009)	0.189***	(0.026)	0.179***	(0.013)	0.059***	(0.018)
age^2	-0.002***	(0.000)	0.002***	(0.000)	-0.001***	(0.000)	-0.002***	(0.000)	-0.000	(0.000)
upper sec. degree	0.411***	(0.111)	-0.415***	(0.031)	1.677***	(0.153)	0.248***	(0.043)	0.192***	(0.072)
tertiary degree	0.503***	(0.131)	-0.629***	(0.050)	2.173***	(0.163)	-0.094	(0.065)	0.422***	(0.095)
exp. as open-ended public	0.982***	(0.036)	0.046	(0.042)	0.036	(0.064)	-0.094	(0.067)	0.081	(0.070)
exp.^{2} as open-ended public	-0.022***	(0.001)	-0.002*	(0.001)	-0.002	(0.002)	0.003**	(0.002)	-0.002	(0.002)
exp. as open-ended private	-0.414***	(0.019)	-0.246***	(0.006)	-0.460***	(0.020)	-0.243***	(0.008)	-0.296***	(0.012)
exp.^{2} as open-ended private	0.008***	(0.001)	0.004***	(0.000)	0.008***	(0.001)	0.005***	(0.000)	0.005***	(0.000)
exp. as fixed-term public	1.702***	(0.178)	1.854***	(0.207)	-0.189	(0.239)	-0.644*	(0.375)	0.196	(0.294)
exp.^{2} as fixed-term public	-0.113***	(0.026)	-0.132***	(0.033)	0.004	(0.013)	0.034*	(0.020)	-0.025	(0.016)
exp. as fixed-term private	-0.307***	(0.061)	0.438***	(0.017)	-0.819***	(0.086)	-0.593***	(0.038)	-0.604***	(0.056)
exp.^{2} as fixed-term private	0.030***	(0.005)	-0.004*	(0.002)	0.055***	(0.005)	0.047***	(0.003)	0.047***	(0.004)
exp. as self-employed	-0.157***	(0.043)	0.078***	(0.009)	-0.043	(0.028)	0.535***	(0.008)	0.189***	(0.014)
exp.^{2} as self-employed	0.003***	(0.001)	-0.003***	(0.000)	-0.001	(0.001)	-0.012***	(0.000)	-0.006***	(0.000)
exp. as professional	0.271***	(0.036)	-0.009	(0.027)	0.693***	(0.021)	0.055*	(0.032)	0.096***	(0.032)
exp.^{2} as professional	-0.009***	(0.001)	-0.001	(0.001)	-0.017***	(0.001)	-0.003***	(0.001)	-0.003***	(0.001)
exp. as atypical	0.063	(0.057)	0.091***	(0.022)	0.074*	(0.044)	0.009	(0.026)	0.823***	(0.021)
exp.^{2} as atypical	-0.004	(0.006)	-0.007***	(0.002)	-0.003	(0.003)	0.000	(0.002)	-0.032***	(0.002)
Constant	-7.688***	(0.588)	0.505***	(0.168)	-8.220***	(0.499)	-4.392***	(0.238)	-4.657***	(0.344)
pseudo-R^2	0.602									
Nr of obs	140441									

AD-SILC , 2004-2017, all individuals working in *t* aged 15-80

- Among demographic characteristics only being foreign increase likelihood of work as private open-ended employee
- Cumulate past work experience in a category increases chances of persistence in that type
- Movements between types occur for fixed-term towards stability and among professional, self-employed and atypical

Multinomial logit (ref. category: open-ended private), female, log odds

	Opend_ended_public		Fixed_term		Professional		Self_employed		Atypical	
	b	se	b	se	b	se	b	se	b	se
EU born	-0.843***	(0.231)	-0.252***	(0.074)	-0.769***	(0.210)	-0.796***	(0.149)	-0.509***	(0.158)
Extra-EU born	-1.419***	(0.185)	-0.423***	(0.055)	-1.354***	(0.255)	-0.576***	(0.096)	-0.841***	(0.126)
studying	0.117	(0.127)	0.685***	(0.049)	0.120	(0.130)	-0.193*	(0.108)	1.034***	(0.075)
age	0.267***	(0.031)	0.011	(0.010)	0.229***	(0.031)	0.201***	(0.019)	0.044**	(0.018)
age^2	-0.003***	(0.000)	0.000	(0.000)	-0.002***	(0.000)	-0.002***	(0.000)	-0.000	(0.000)
upper sec. degree	-0.062	(0.106)	-0.486***	(0.035)	1.229***	(0.168)	0.092	(0.062)	-0.002	(0.074)
tertiary degree	0.750***	(0.112)	-0.531***	(0.046)	2.330***	(0.168)	-0.323***	(0.084)	0.412***	(0.085)
children aged 0-6	0.084	(0.079)	-0.187***	(0.040)	-0.418***	(0.125)	0.331***	(0.061)	-0.380***	(0.079)
exp. as open-ended public	0.962***	(0.032)	0.110***	(0.031)	-0.088	(0.071)	0.004	(0.059)	-0.171**	(0.077)
exp.^{2} as open-ended public	-0.021***	(0.001)	-0.003***	(0.001)	0.002	(0.002)	0.001	(0.001)	0.003*	(0.002)
exp. as open-ended private	-0.352***	(0.015)	-0.268***	(0.006)	-0.552***	(0.026)	-0.262***	(0.010)	-0.328***	(0.013)
exp.^{2} as open-ended private	0.008***	(0.001)	0.006***	(0.000)	0.012***	(0.001)	0.005***	(0.000)	0.006***	(0.000)
exp. as fixed-term public	1.676***	(0.105)	1.917***	(0.105)	-0.290	(0.250)	-0.688**	(0.347)	0.127	(0.161)
exp.^{2} as fixed-term public	-0.101***	(0.011)	-0.132***	(0.014)	0.029	(0.018)	0.052**	(0.023)	-0.002	(0.013)
exp. as fixed-term private	-0.148***	(0.051)	0.506***	(0.018)	-0.712***	(0.094)	-0.769***	(0.054)	-0.507***	(0.051)
exp.^{2} as fixed-term private	0.022***	(0.005)	-0.006***	(0.002)	0.052***	(0.006)	0.058***	(0.004)	0.045***	(0.003)
exp. as self-employed	-0.078*	(0.040)	0.075***	(0.012)	-0.056	(0.044)	0.573***	(0.011)	0.100***	(0.020)
exp.^{2} as self-employed	0.002	(0.001)	-0.003***	(0.000)	0.000	(0.001)	-0.013***	(0.000)	-0.003***	(0.001)
exp. as professional	0.186***	(0.038)	-0.001	(0.026)	0.707***	(0.031)	-0.006	(0.043)	-0.038	(0.037)
exp.^{2} as professional	-0.008***	(0.002)	-0.000	(0.001)	-0.020***	(0.002)	-0.001	(0.002)	0.000	(0.001)
exp. as atypical	0.104**	(0.046)	0.045**	(0.021)	0.073	(0.045)	-0.056	(0.037)	0.791***	(0.024)
exp.^{2} as atypical	-0.007	(0.005)	-0.002	(0.002)	-0.005	(0.004)	-0.000	(0.004)	-0.036***	(0.002)
Constant	-7.834***	(0.562)	-1.001***	(0.188)	-8.314***	(0.595)	-5.302***	(0.348)	-3.520***	(0.325)
pseudo-R^2	0.592									
Nr of obs	110747									

AD-SILC , 2004-2017, all individuals working in *t* aged 15-80

- Motherhood is more associated with open-ended private contract than any other category, except for self-employed
- Very similar patterns with respect to men for both socio-demographic and labor-related characteristics
- Exception: women have 'upgrading' transitions if working as professionals (do not move towards atypical as men do) or working as atypical (move also towards open-endend public contracts, while men did not)

Monthly wages (log) of private employees by sex, % changes

		Male		Female	
		b	se	b	se
Socio-demographic	EU born	-0.042***	(0.011)	-0.126***	(0.010)
	Extra-EU born	-0.084***	(0.006)	-0.184***	(0.007)
	children aged 0-3	0.026***	(0.004)	-0.030***	(0.004)
	children aged 4 and over	0.014***	(0.004)	-0.029***	(0.004)
	upper sec. degree	0.106***	(0.003)	0.120***	(0.003)
	tertiary degree	0.278***	(0.004)	0.243***	(0.005)
	partner working	0.026***	(0.003)	0.016***	(0.003)
Labor market related	part-time	-0.062***	(0.004)	-0.017***	(0.003)
	open-ended contract	0.025***	(0.002)	0.007**	(0.003)
	exp. as private employee	0.030***	(0.000)	0.021***	(0.001)
	exp. as private employee^2	-0.000***	(0.000)	-0.000***	(0.000)
	Constant	7.279***	(0.005)	7.224***	(0.006)
	σ_u	0.300		0.288	
	σ_e	0.118		0.129	
	ρ	0.867		0.833	
	R^2-within	0.030		0.017	
	R^2-between	0.357		0.254	
	R^2-overall	0.338		0.242	
	Nr of obs	87137		63187	

AD-SILC , 2004-2017, all individuals working in *t* aged 15-70 – excluding retired

Number of months worked

		Male		Female	
		b	se	b	se
Socio-demographic	foreign	0.184**	(0.092)		
	retired	-0.816***	(0.153)	-0.764***	(0.192)
	studying	-1.193***	(0.088)	-0.701***	(0.076)
	children aged 0-6	0.310***	(0.087)		
	upper sec. degree	0.558***	(0.060)	0.516***	(0.059)
	tertiary degree	1.034***	(0.096)	1.282***	(0.079)
Labor market related	fixed-term private employee	-1.465***	(0.143)	-1.448***	(0.084)
	atypical	-2.474***	(0.153)	-2.487***	(0.095)
	working(lag)	1.431***	(0.055)	1.624***	(0.050)
	experience	0.080***	(0.008)	0.068***	(0.009)
	experience ^{2}	-0.001***	(0.000)	-0.001***	(0.000)
	Constant	4.405***	(0.177)	3.963***	(0.135)
	σ_u	2.228		2.025	
	σ_e	1.850		1.883	
	ρ	0.592		0.536	
	R^2-within	0.075		0.068	
	R^2-between	0.171		0.217	
	R^2-overall	0.147		0.182	
	Nr of obs	14687		16633	

AD-SILC , 2004-2017, all individuals 15-80 aged working as fixed-term employee or atypical

Future Implementations

Existing regression models:

- Use RE models whenever relevant, adding individual mean of time-variant covariates to relax RE assumption of independence with individual effects if needed
- Investigate if any of the economic relationships analysed with panel data model is dynamic in nature, adding lagged dependent variable
- Investigate if error component show serial correlation, taking into account the unbalanced and sometimes irregularly spaced nature of observations

New regression models:

- Model unemployment among those out of work
- Distinguish between a first and a second employment relationships