



SECOND INTERNATIONAL WORKSHOP - MOSPI PROJECT

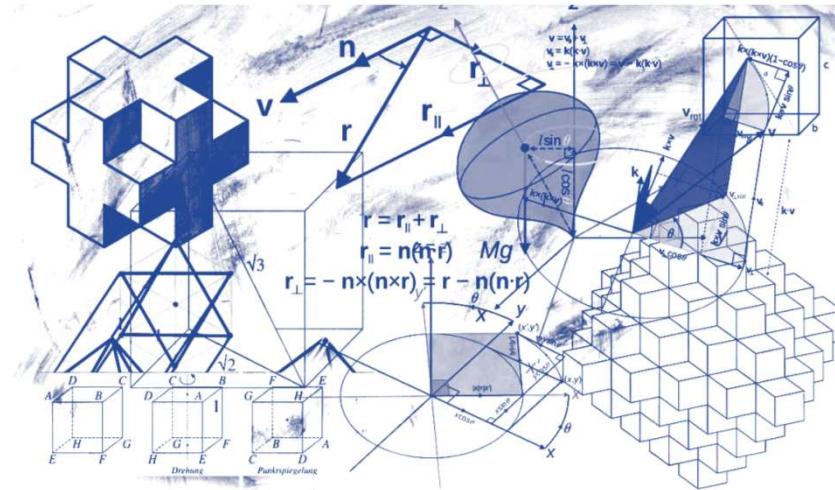
The Treasury Dynamic Microsimulation Model (T-DYMM): structure, preliminary results and future implementations

PANEL 2

Labor Market and Wealth

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Discussants: Giovanni Gallo, Paolo Acciari, Federico Belotti



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

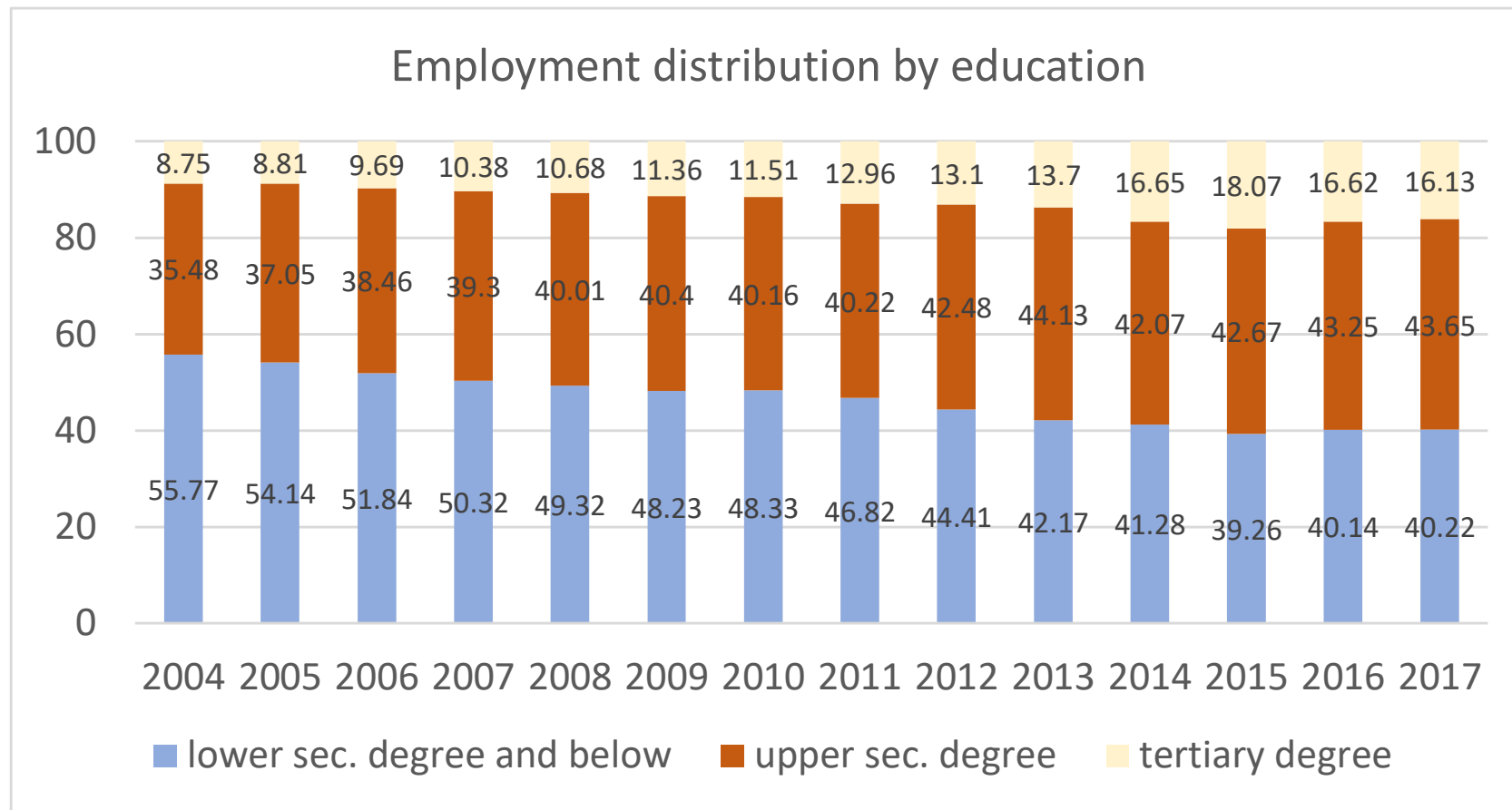
The Italian Labor Market over 2004-2017



Overtime workforce is continuously ageing and therefore changing.



The Italian Labor Market over 2004-2017

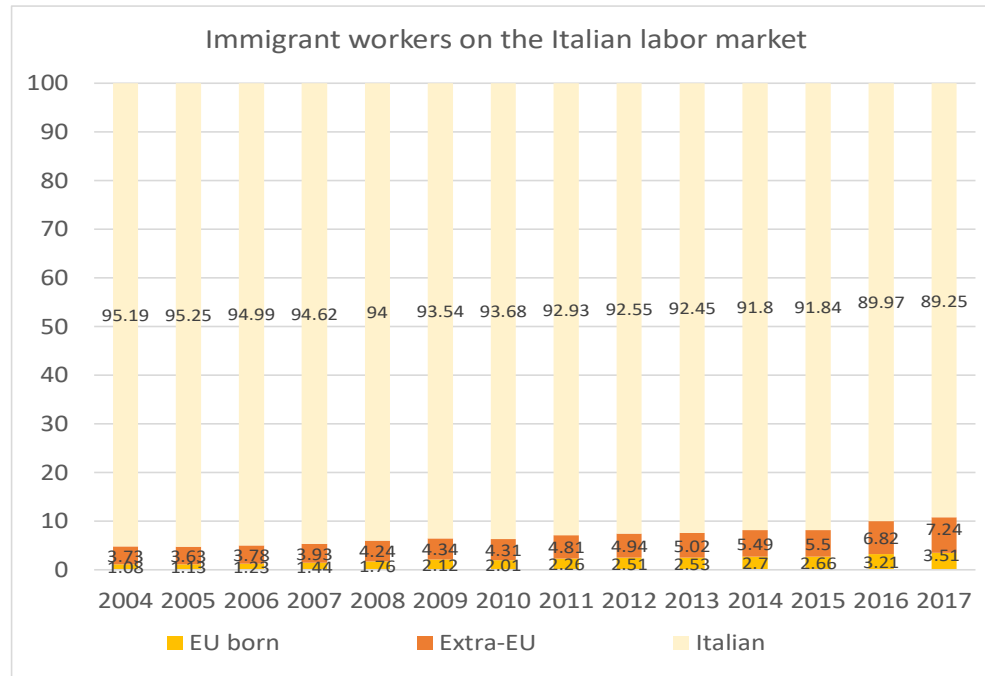


Elaboration on AD-SILC, 2004-2017



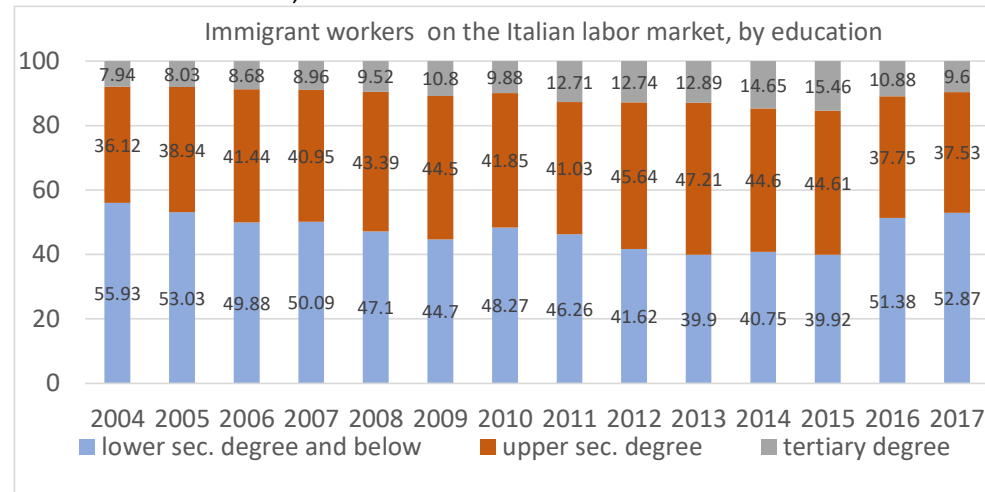
Decrease of the share of workers with a lower secondary degree at most, consequently favoring the component with the highest educational qualification

The Italian Labor Market over 2004-2017



The immigrant workforce share gradually rose

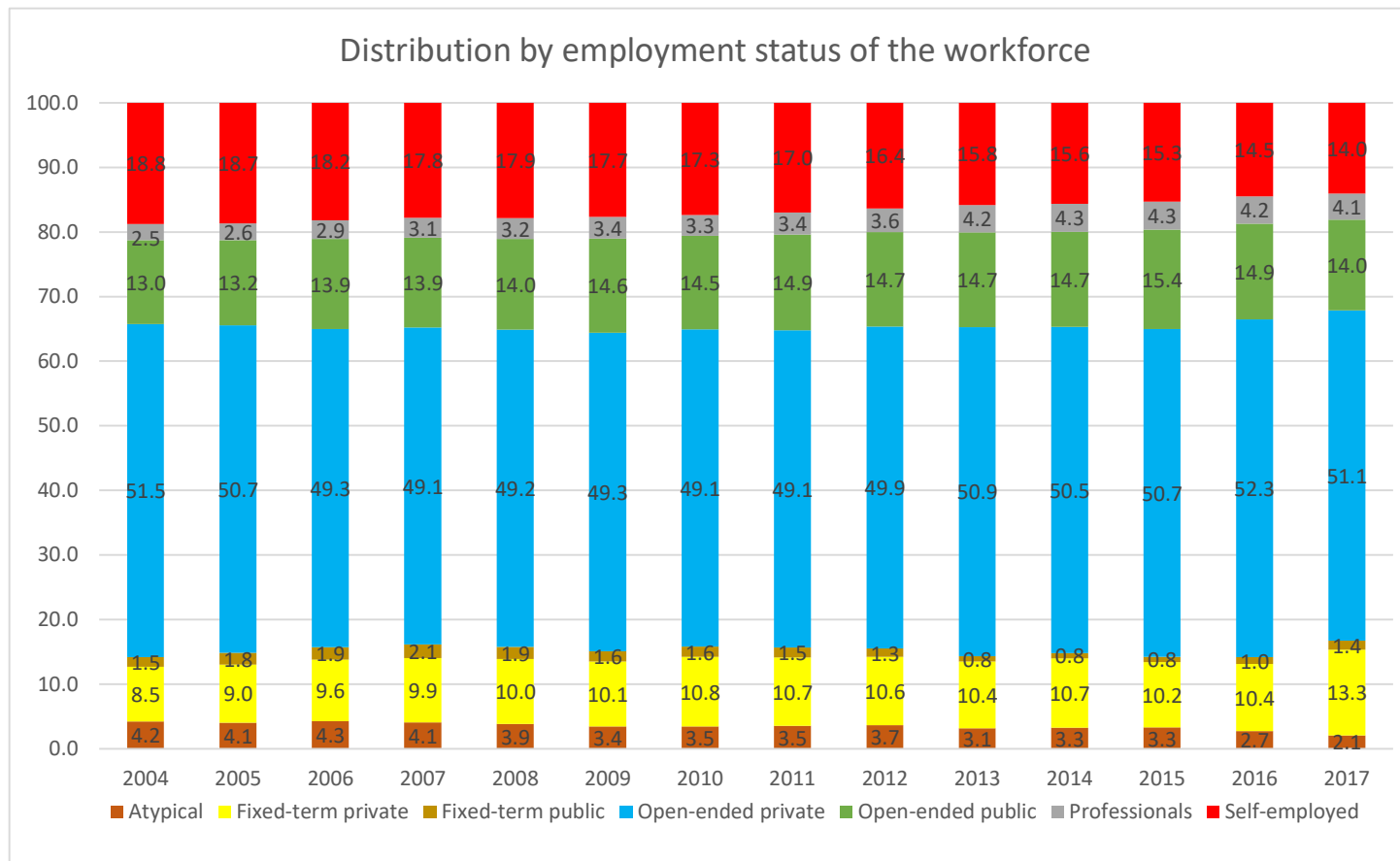
Elaboration on AD-SILC, 2004-2017



Immigrant influx tend to be more educated over time



The Italian Labor Market over 2004-2017



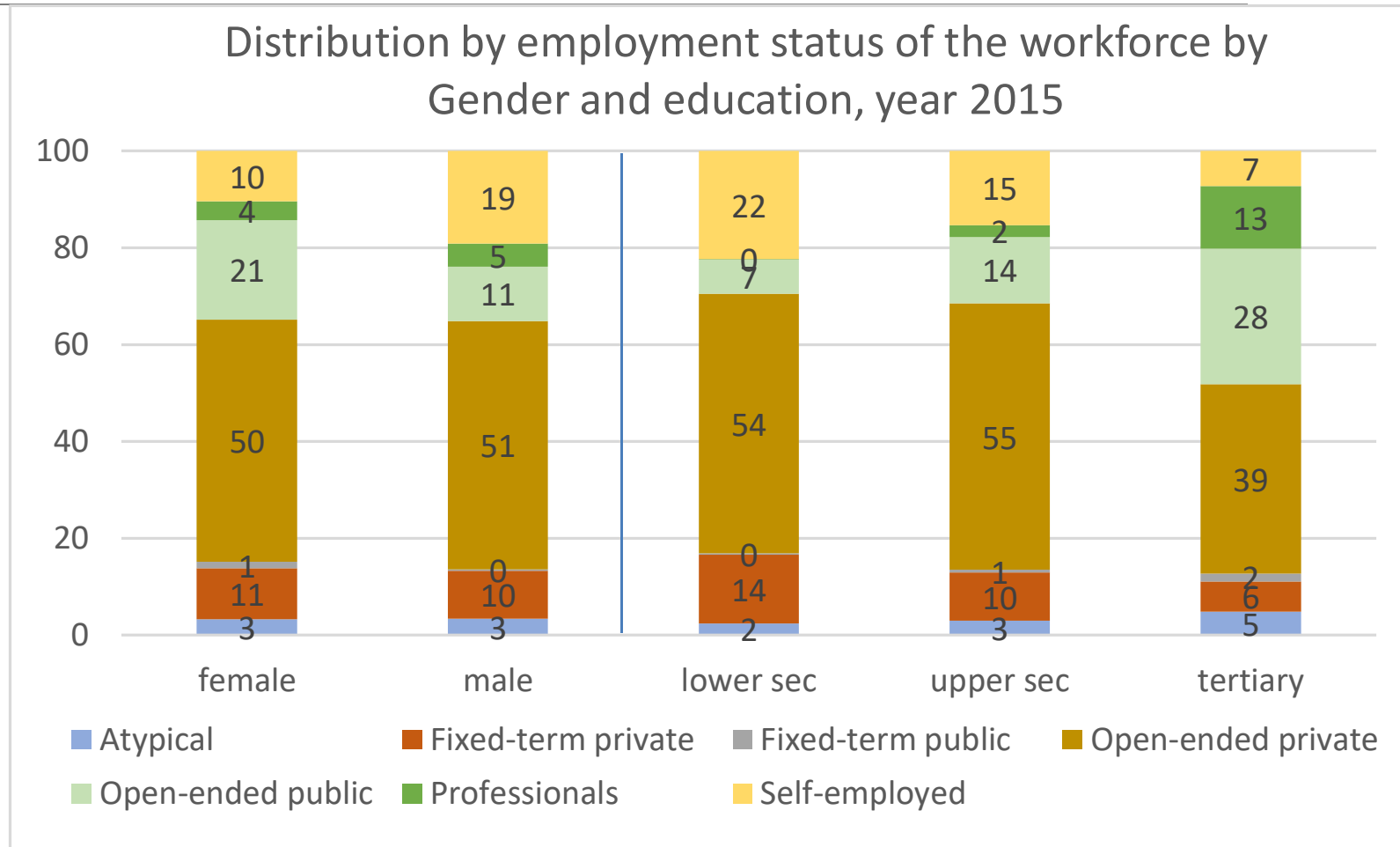
Elaboration on AD-SILC , 2004-2017

over time:

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



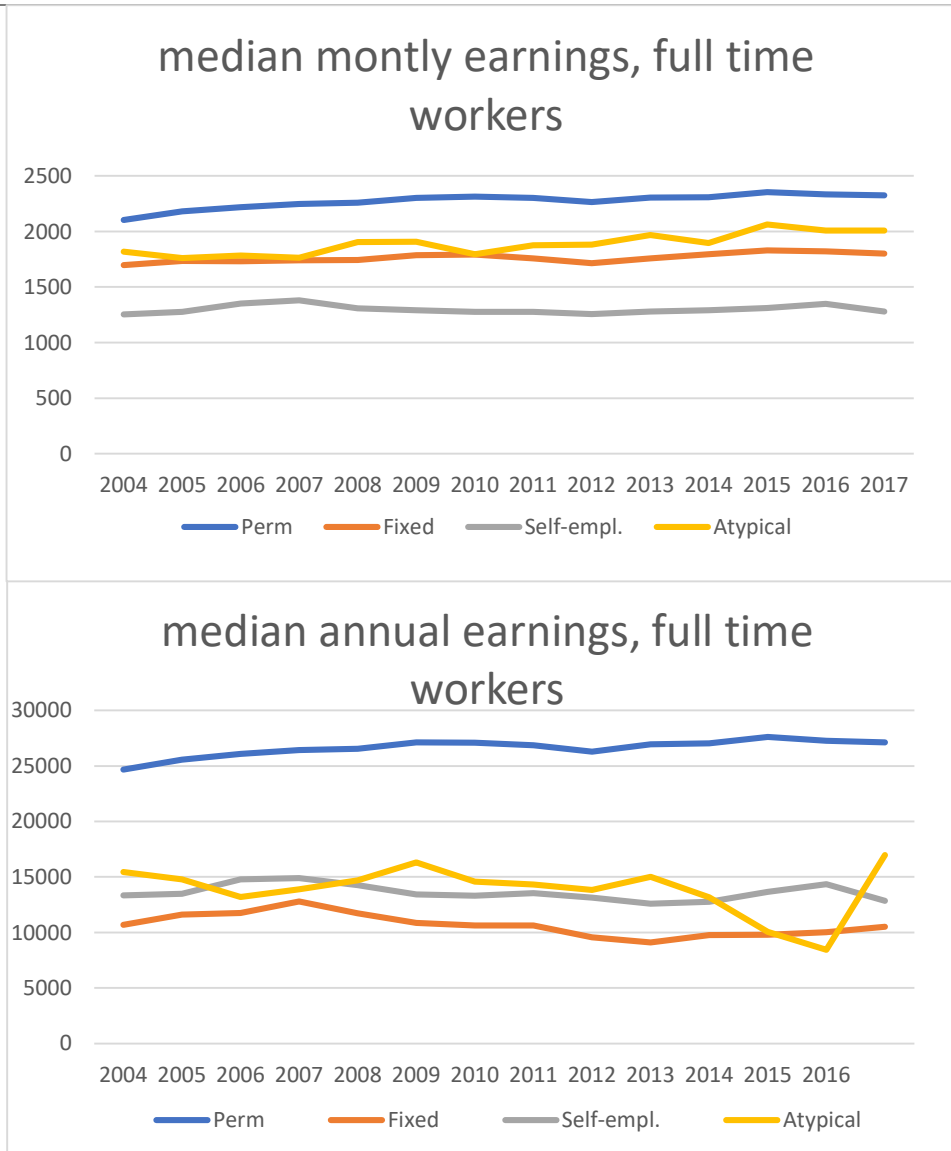
The Italian Labor Market over 2004-2017



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

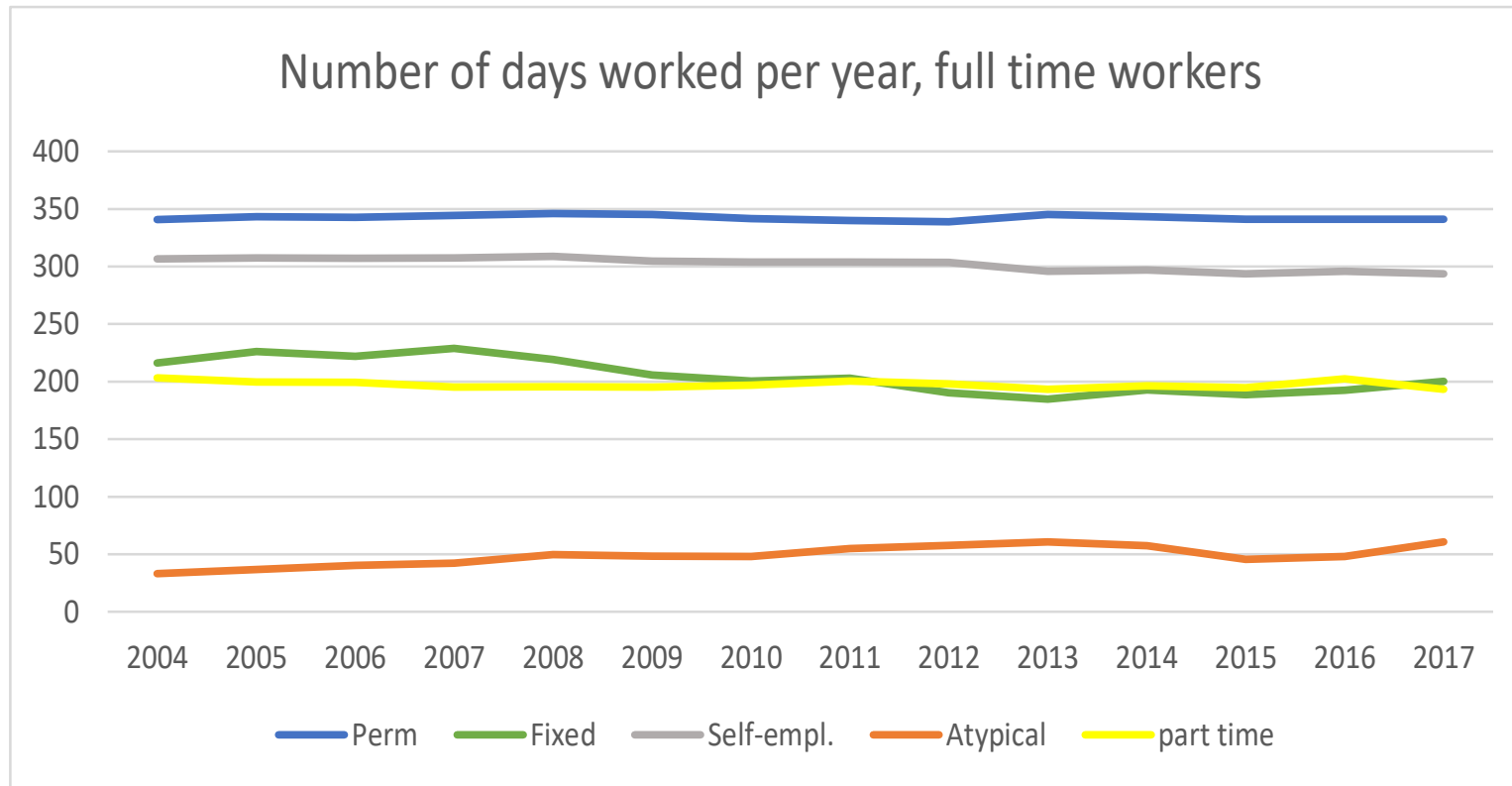
Workforce with tertiary education is more frequent having an open-ended contract in public or Professional fields, in comparison to those with lower education.

Evidence from labor earnings dynamics



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

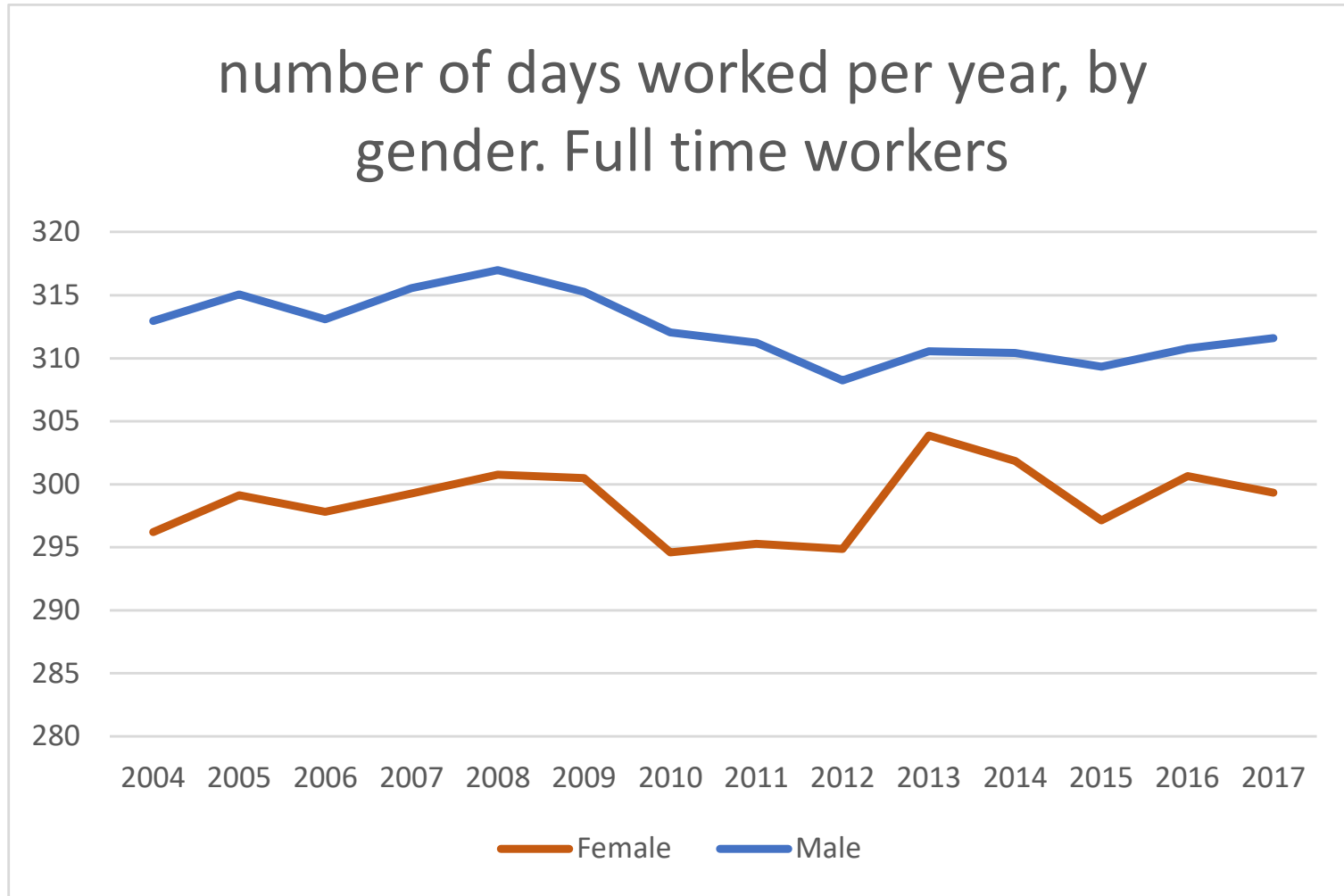
Evidence from intensity of work



Elaboration on AD-SILC , 2004-2017

Differences in the number of work days therefore differences in earnings

Evidence from intensity of work

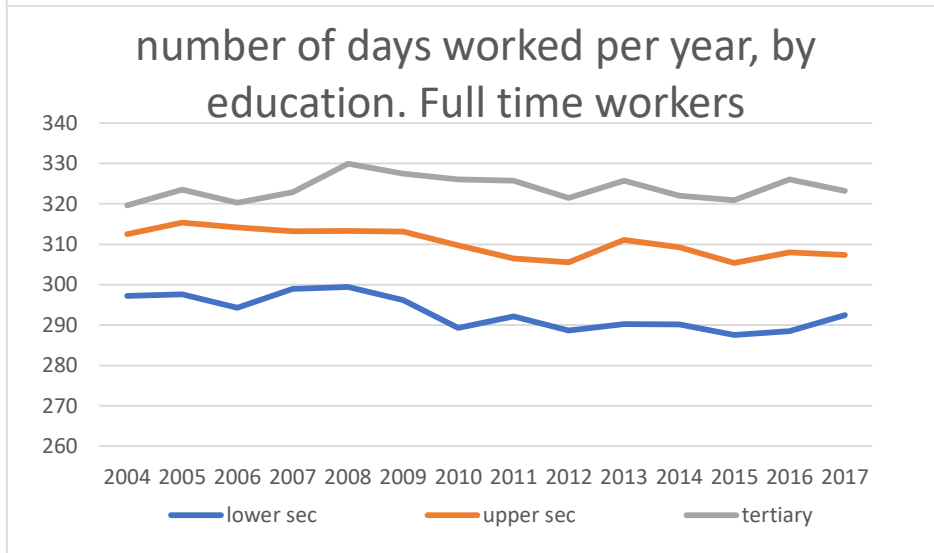
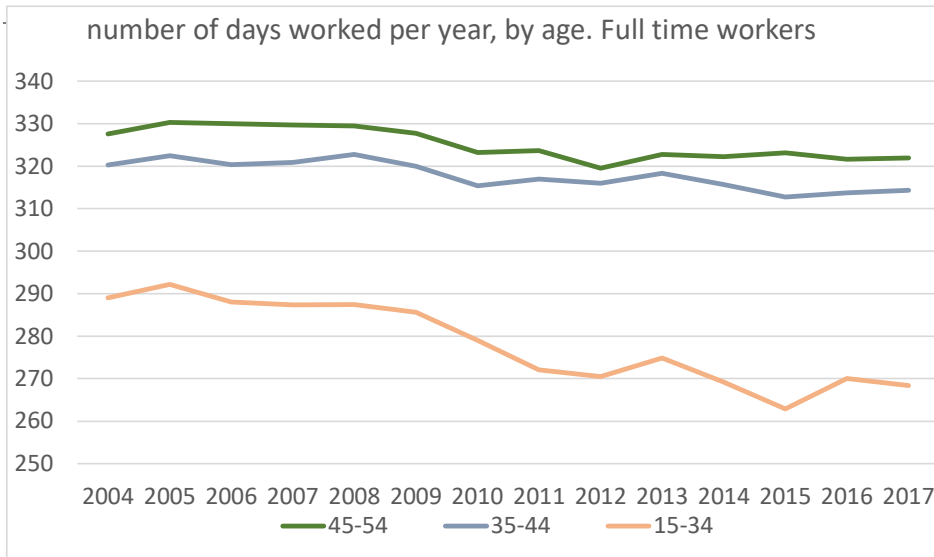


Elaboration on AD-SILC , 2004-2017

Strong differences are observed between the gender work days



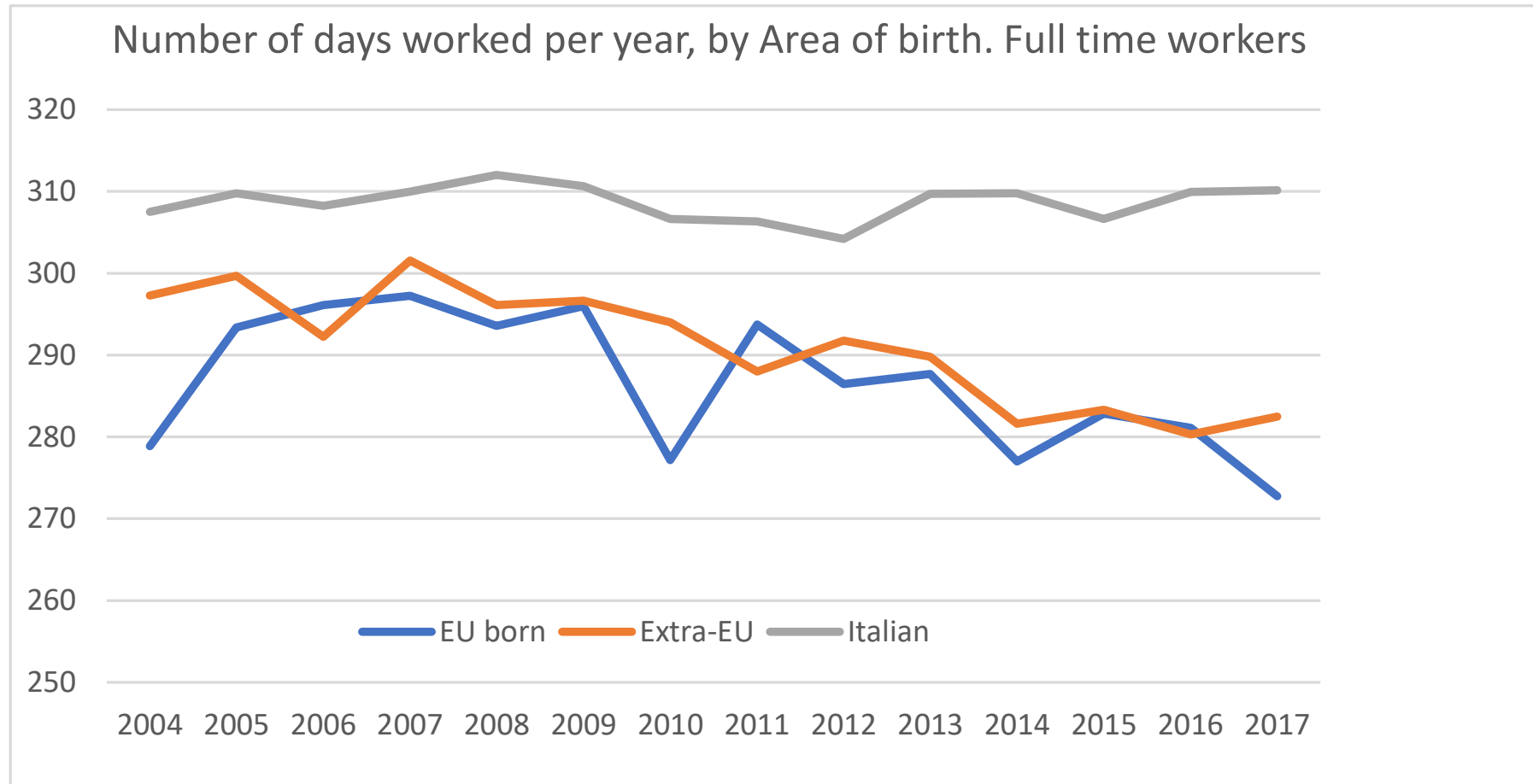
Evidence from intensity of work



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.

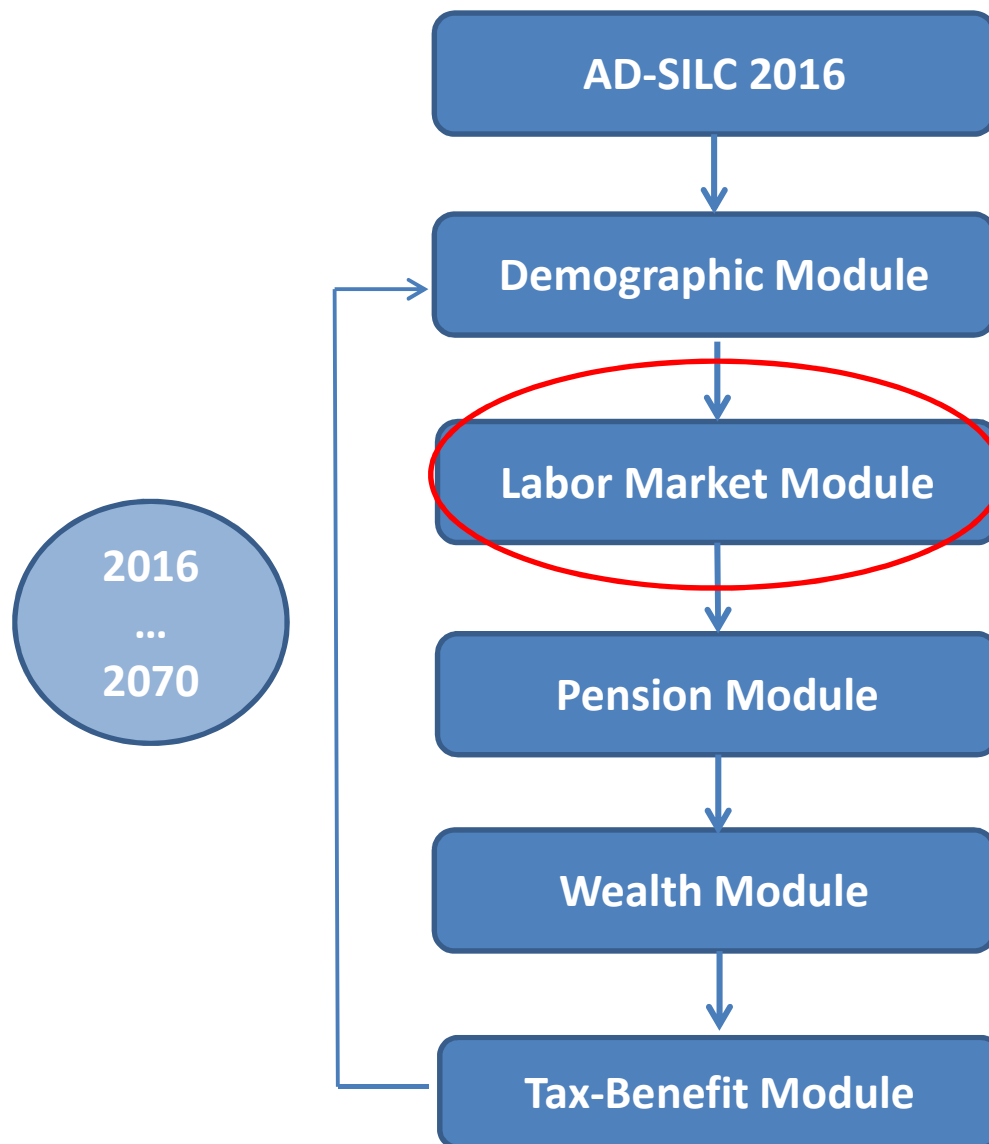
Labor market transitions

Transition matrix: working conditions after 2 years, by education

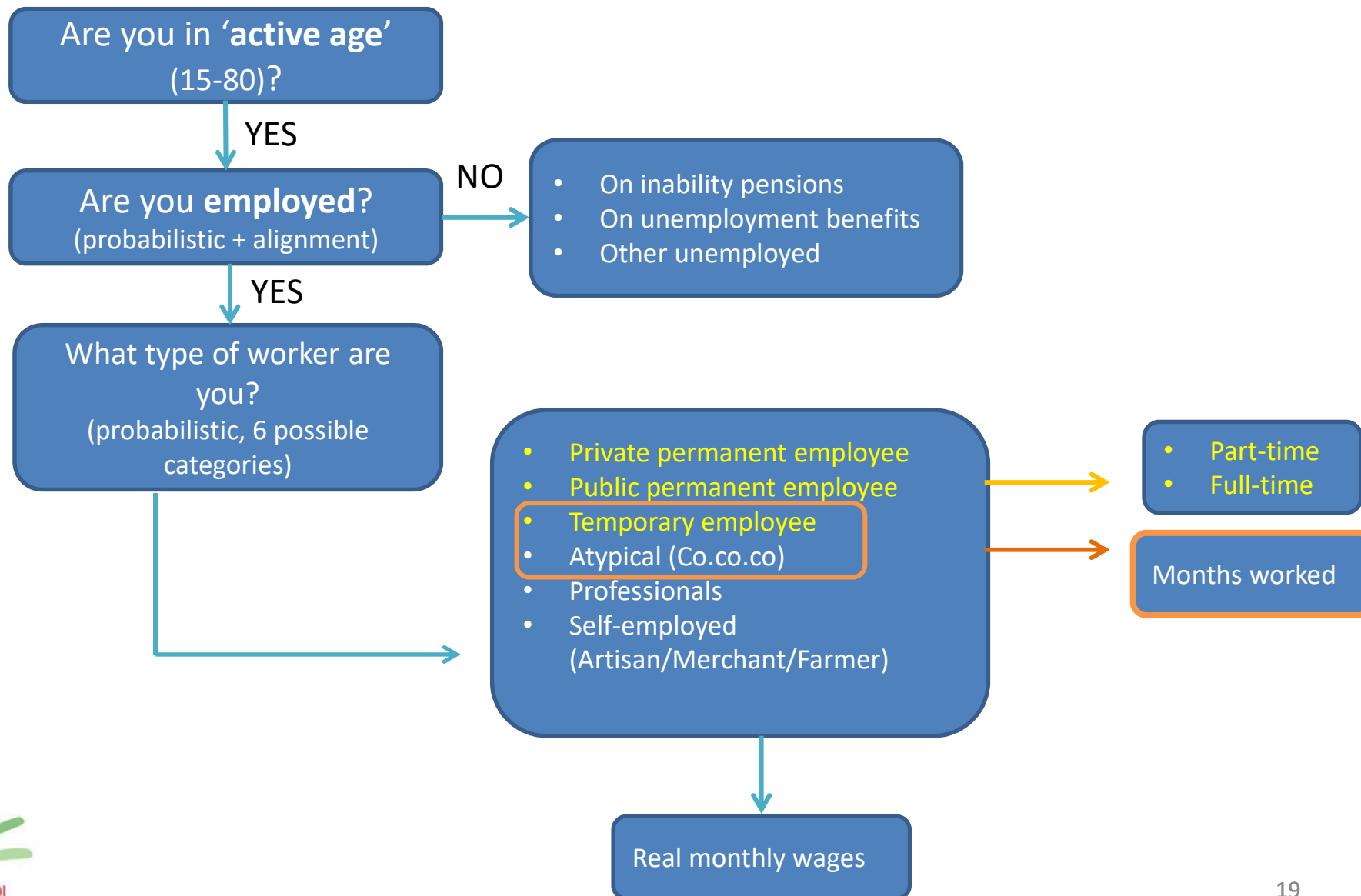
At most lower-secondary					
2017					
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	83.0	4.8	0.6	0.0	11.5
Fixed	21.7	59.0	0.3	0.3	18.7
Self-empl.	2.2	1.6	84.3	0.4	11.5
Atypical	9.8	16.7	2.9	30.4	40.2
Upper-secondary					
2017					
2015	Perm	Fixed	Self-empl.	Atypical	out of work
Perm	86.8	4.2	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

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



The Labor market estimates

Probability of being employed

- *Sample*: all individual aged between 15 and 80, including students and retired observed over the entire 2004-2017 span
- *Model*: for the time being, logit is used clustering s.e. at individual level but RE yields very similar results



Among those working, the **probability of being a certain typology of worker**

- *Sample*: all individual working in t excluding those retired (dedicated & simplified regression)
- *Model*: Multinomial logit for preliminary estimates
- Further logit regressions distinguish between between part-time/full-time employees and private/public fixed-term employees

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		

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-ended public contracts, while men did not)

The Labor market estimates, once employment typology is assigned:

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

monthly gross wages

months worked

Real gross monthly wages**:

- *Sample*: all individual working in t excluding those retired (dedicated regression) and assigned to a specific employment category (fixed-term and open-ended employee are considered together, by sector)
- *Model*: GLS RE model with a permanent error component (i.e. soft skills, motivation), that represent constant wage deviation for each individual + a transitory component (white noise error with no memory and i.i.d.)

Number of months worked

- *Sample*: fixed-term employees or atypical only, other categories work all year by default
- *Model*: GLS RE model as for real wages

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