



INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

»» Labour Market Flows

16th Workshop on Labour Force Survey Methodology
Session 5 - LFS results and outcomes

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2. Statistical products
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5. Weighting
6. Back data revision
7. Model-based estimation (regression models)
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1. Introduction

- Labour market flows: movements of persons between ILO states (E, U and I).
- Quarterly flows: movements between two consecutive quarters.
- Annual flows: movements between two consecutive years (average of the four flows that result from the comparison of each quarter of the target year with the same quarter of the previous year).
- Scope: persons aged 16 to 89 years in the target quarter or target year (15 to 74 for Eurostat) .

Figure 1. Quarterly labour market flows
(thousand persons)

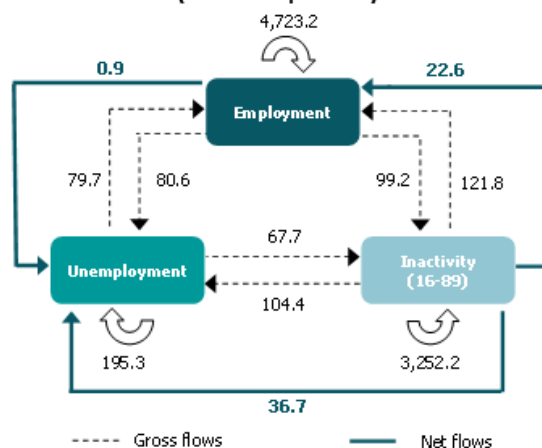
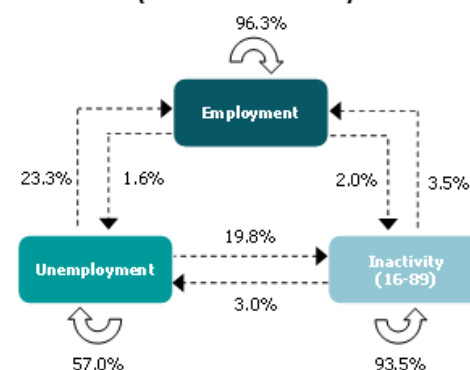


Figure 2. Quarterly labour market flows
(in % of initial status)



Source: Statistics Portugal, Labour Force Survey - 1st quarter of 2023.

2. Statistical products

- Autonomous quarterly Press Release since the 4th quarter of 2021 (annual flows along with the 4th quarter of every year). From the 1st quarter of 2006 to the 3rd quarter of 2021 publication was done under a specific chapter in the “Employment Statistics” Press Release.
- Database online access in the Statistics Portugal website (limited number of quarterly and annual flows).

Home / Products / Press Releases

Theme: Labour market



Employment statistics
Labour Market Flow Statistics

26.2% of the unemployed in the 3rd Quarter 2022
15 February 2023

Summary
In the 4th quarter of 2022
Of the total people who were under

■ Press release
PDF (491 Kb)

■ Tables
Excel - 4Q2022 (55 Kb)
Excel - 2022 (74 Kb)
CSV - 4Q2022 (7 Kb)
CSV - 2022 (9 Kb)

HomePage / Products / Database

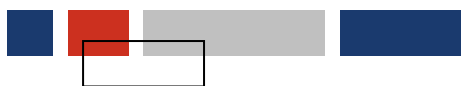
List Navigation Tree Navigation

- Labour market
 - Activity
 - Employment
 - Flows
 - Flows from employment to employment (series 1998)
 - Flows from employment to employment (series 2011)
 - Flows from employment to employment (series 2021)



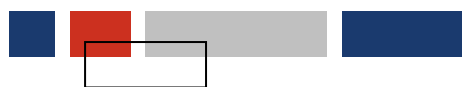
2. Statistical products

- Press release indicators:
 - Main labour market flows (E_E, E_U, E_I, U_E, U_U, U_I, I_E, I_U and I_I);
 - Unemployment quarterly flows (U_E, U_U and U_I) by sex;
 - Net flows into unemployment;
 - Flows between employment, unemployment (by duration) and type of inactivity (“potential workforce” and others);
 - Flows between professional status, unemployment and inactivity;
 - Flows by permanency on the job (permanent and temporary);
 - Flows between full-time and part-time workers and employees;
 - Job-to-job transition rate (in % of permanency in employment).
- Online access:
 - Main labour market flows (E_E, E_U, E_I, U_E, U_U, U_I, I_E, I_U and I_I) by sex.



3. LFS sampling design

- LFS sample is selected under a two-stage stratified random sampling design.
- Sample size of approximately 30,000 dwellings to met the IESS precision requirements.
- Each quarter the sample is made up of six subsamples where each subsample is replaced by new one (selected under the same design) after being observed for six consecutive quarters.
- Data collection mode: CAPI (1st wave – suspended from March 2020 until the end of the 2022Q2 due to COVID-19 pandemic) and CATI (2nd to 6th waves).
- Each person is assigned a cross-sectional weight that derives from a design weight, a non-response weight adjustment and a calibration factor to external sources.



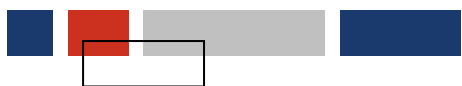
4. Quarterly and annual sample flows

- “Pseudo-longitudinal” sample:

2021Q1	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4
CATI; W6							
CATI; W5	CATI; W6						
CATI; W4	CATI; W5	CATI; W6					
CATI; W3	CATI; W4	CATI; W5	CATI; W6				
CATI; W2	CATI; W3	CATI; W4	CATI; W5	CATI; W6			
CATI; W1	CATI; W2	CATI; W3	CATI; W4	CATI; W5	CATI; W6		
	CATI; W1	CATI; W2	CATI; W3	CATI; W4	CATI; W5	CATI; W6	
		CATI; W1	CATI; W2	CATI; W3	CATI; W4	CATI; W5	CATI; W6
			CATI; W1	CATI; W2	CATI; W3	CATI; W4	CATI; W5
				CATI; W1	CATI; W2	CATI; W3	CATI; W4
					CATI; W1	CATI; W2	CATI; W3
						CATI; W1	CATI; W2
							CATI; W1

$\approx 5/6$ Quarterly flow sample

$\approx 1/3$ Annual flow sample

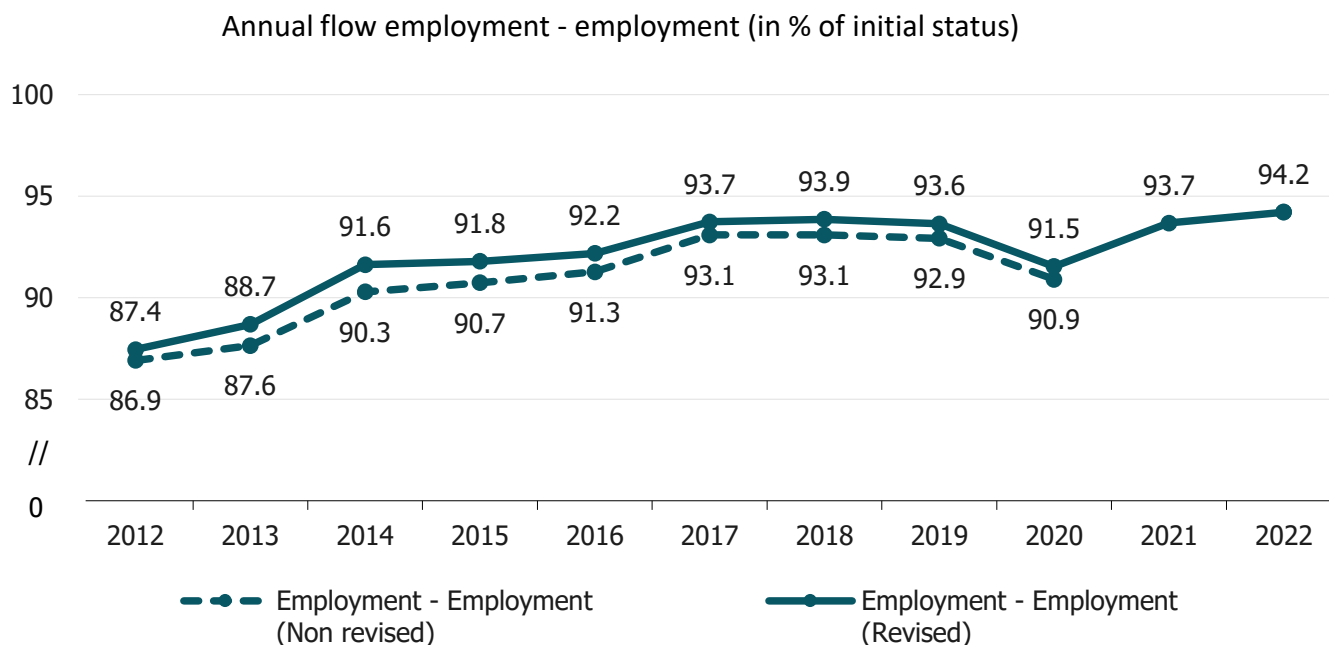


5. Weighting

- Every person in the subsample of quarterly flows (or in the four subsamples of annual flows) is assigned a weight that derives from:
 - The cross-sectional weight of the target quarter (or of the four quarters of the target year).
 - An adjustment factor to compensate subsampling and attrition.
 - A calibration factor to ensure the consistency between the quarterly stocks and gross quarterly flows in the initial and target quarters (or the consistency between the gross annual flows and the annual averages in the initial and target year).
 - Calibration control totals: demographic estimates by region (NUTS II), sex and ten-year age groups and the quarterly stocks (by professional status, work contract, full-time/part-time job, duration of unemployment or type of inactivity).

6. Back data revision

- Following updated labour status definitions introduced in 2021 (persons engaged in agriculture and fishing activities exclusively for self-consumption are no longer considered in employment and restriction of persons in labour force to those aged 16 to 89).
- Back data revision for quarterly and annual flows since 2011.



7. Model-based estimation

- Flows (in % of the initial status) can also be obtained under a logistic regression model.
- Internal exercise at Statistics Portugal.
- Results can be presented as predicted probabilities or as the average marginal effect (the average change in probability of moving from one state to another when the continuous variable increases by one unit or the qualitative variable increases by a discrete change in the baseline category, keeping all else equal).
- Method used by Eurostat to produce Experimental Statistics.



7. Model-based estimation

- Example: probability of moving from unemployment (U) in the 2022Q4 to employment (E) in the 2023Q1 by duration of unemployment, sex and age group.
 - Dependent variable (Y): 1 if a person moved from U to E; 0 otherwise;
 - Explanatory variables (X): duration of unemployment (less than 1 year – baseline; 1 year or more); sex (male; female – baseline) and age (continuous);
 - Model (weighted and with interactions):
$$\text{logit}(p_i) = \beta \cdot \text{duration}_i \times \text{age}_i \times \text{age}_i \times \text{sex}_i$$
- Cons: if sample size is small, a different model should be specified for other breakdowns (by previous work experience, highest level of education, classification of urban areas, ...).
 - $\text{logit}(p_i) = \beta \cdot \text{prevwork}_i \times \text{age}_i \times \text{age}_i \times \text{sex}_i$
 - $\text{logit}(p_i) = \beta \cdot \text{hatlevel}_i \times \text{age}_i \times \text{age}_i \times \text{sex}_i$
 - $\text{logit}(p_i) = \beta \cdot \text{urban}_i \times \text{age}_i \times \text{age}_i \times \text{sex}_i$

7. Model-based estimation

Probability of moving from unemployment (U) in the 2022Q4 to employment (E) in the 2023Q1 by duration of unemployment, sex and age group (%)

Regression model: $\text{logit}(p_i) = \beta \cdot \text{duration}_i \times \text{age}_i \times \text{sex}_i$

$\Pr(Y = 1)$:

1	Delta-method Margin	std. err.	t	P> t
_cons	,2326352	,0170076	13,68	0,000

$\Pr(Y = 1|Male)$:

2	Delta-method Margin	std. err.	t	P> t
_cons	,2454702	,024428	10,05	0,000

$\Pr(Y = 1|Female)$:

3	Delta-method Margin	std. err.	t	P> t
_cons	,2214512	,0229578	9,65	0,000

$\Pr(Y = 1|In\ unemployment\ for\ less\ than\ 1\ year)$:

4	Delta-method Margin	std. err.	t	P> t
_cons	,3125619	,0249592	12,52	0,000

$\Pr(Y = 1|In\ unemployment\ for\ 1\ year\ or\ more)$:

5	Delta-method Margin	std. err.	t	P> t
_cons	,1220411	,0211485	5,77	0,000

7. Model-based estimation

Flows from unemployment (U) in the 2022Q4 to employment (E) in the 2023Q1 (Press Release)

Design-based method (ratio between those who moved from U in the 2022Q4 to E in the 2023Q1 and total U in the 2022Q4):

Figure 2. Quarterly labour market flows
(in % of initial status)

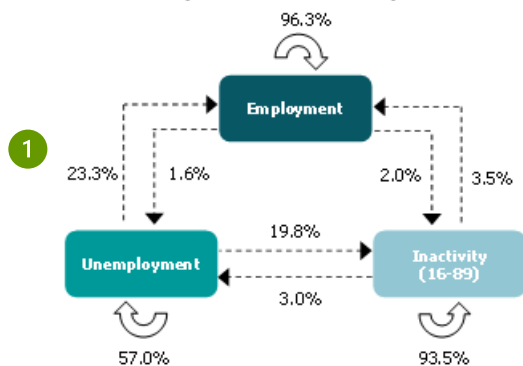


Figure 3. Unemployment quarterly flows – Males
(in % of initial status)

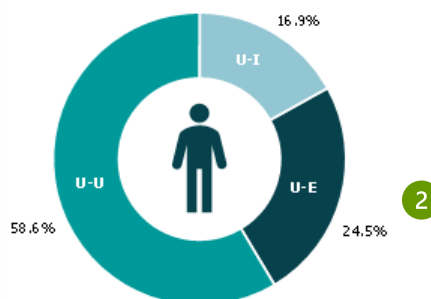
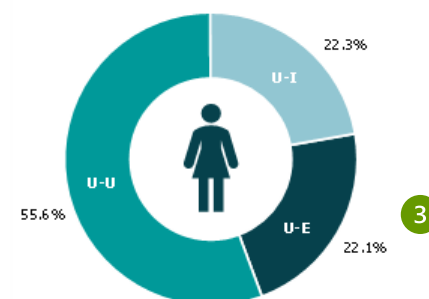
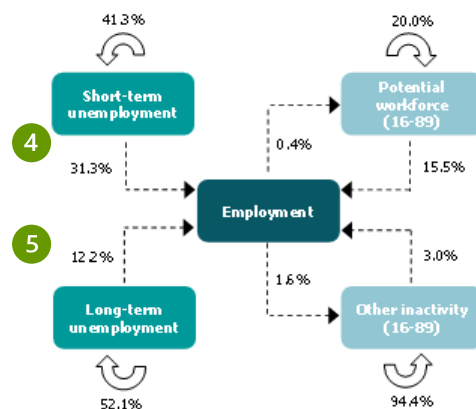


Figure 4. Unemployment quarterly flows – Females
(in % of initial status)



U-E: Transition unemployment-employment U-U: Transition unemployment-unemployment U-I: Transition unemployment-inactivity

Figure 5. Quarterly flows between employment, unemployment
(by duration) and type of inactivity (in % of initial status)



Consistency between logit model and the design-based method (Press Release results)



7. Model-based estimation

- However, duration models (also called failure time models, survival models or transition models) should also be considered when modelling duration of unemployment.
 - Survival function: $S(t) = \Pr(T > t)$ is the probability of remaining in unemployment (“not failing event”) beyond t , where T is the lifetime (or survival time).
 - Hazard function: instantaneous risk of moving from U to E (“failing event”) at time t given the individual remained in U until then.
 - Cox Proportional Hazard model.
 - Kaplan-Meier estimator (to measure the survival time from a certain moment to time failure).

8. Challenges for the future

- How to estimate the (flows) standard errors when weights are calibrated to random control totals (stock estimates from the full quarterly sample or from annual averages)?
- Explore duration models to model unemployment duration or other cases where the outcome of interest is time until an event occurs.
- How to account for inflows to and outflows from the population?

1Q23 4Q22	E	U	I	Total 4Q22
E	EE	EU	EI	E_{4Q22}
U	UE	UU	UI	U_{4Q22}
I	IE	IU	II	I^*_{4Q22}
Total 1Q23	E_{1Q23}	D_{1Q23}	I_{1Q23}	Pop_{1Q23}

$$I^*_{4Q22} = Pop_{1Q23} - E_{4Q22} - U_{4Q22}$$

Pop_{1Q23} : Population aged 16 to 89 in the 1Q2023



1Q23 4Q22	E	U	I	Outflows (O)	Total 4Q22
E	EE	EU	EI	EO	E_{4Q22}
U	UE	UU	UI	UO	U_{4Q22}
I	IE	IU	II	IO	I_{4Q22}
Inflows (N)	NE	NU	NI	-	Y_{4Q22}
Total 1Q23	E_{1Q23}	D_{1Q23}	I_{1Q23}	X_{1Q23}	-

Pop_{4Q22}
 $Pop_{15 \rightarrow 16} + Imigration$

Pop_{1Q23}

Deaths +
 $Pop_{89 \rightarrow 90} +$
 Emigration

Thank you!