

The European Commission's science and knowledge service Joint Research Centre



Unemployment benefit expenditure across the business cycle. An assessment using EUROMOD

Salvador Barrios, Alberto Tumino, Wouter van der Wielen

EUROMOD Research Workshop, 18 September 2018, Vienna

Acknowledgment and disclaimer

- The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this presentation. The results and their interpretation are the authors' responsibility.
- The authors are grateful to the EUROMOD team at ISER, and in particular to Xavier Jara, for assisting in the analysis providing data on unemployment benefit simulation.
- We thank Richard Lewney from Cambridge Econometrics for letting us use the macro scenarios based on E3ME produced in 2016 for the project "Micro and Macro Effects of a European Unemployment Benefit Scheme", in which Alberto Tumino was involved. The scenarios have an illustrative role.

Outline

- Introduction
- Methods and Data
- Results
- Conclusion and next steps

Introduction

- Aim: Forecast unemployment benefit expenditure across the business cycle
- Relevant for policy design, study of automatic stabilisation, work incentives.
- CABB: Adjusts government budget for the business cycle. Assumes unitary elasticity of UB expenditure w.r.t. level of unemployment.
- Expenditure benchmark: cyclical component of unemployment benefit expenditures (at unchanged policies) needs to be estimated.
- Past crisis had seen in some cases significant deterioration in budget balance led by large unemployment changes.

Strategy

1. Macro scenario → Predicted number of unemployed and coverage rate at country level
2. Micro scenario → Predicting unemployment risk and selection of new unemployed on the basis of 1
3. Simulating UB in EUROMOD
4. Analysis: Aggregate expenditure in UB, elasticity, work incentives, etc.

Macro Model

- Macro model provides scenarios:
 - Number of LT and ST unemployed
 - Unemployment rate
- This presentation uses E3ME from Cambridge Econometrics (same shocks used in project Micro and Macro Effects of a European Unemployment Benefit Scheme)
- In future QUEST? SVAR?

Predicting coverage rates

Dep Variable: Short term coverage rate

Data: EU-LFS (1995-2013)

	Estimated Coefficient	Std. Err.
Unemployment rate	0.912***	(0.137)
_cons	60.189***	(1.961)
Country Fixed Effects	Yes	
N	438	
R ²	0.816	

Short term coverage rates and unemployment rates positively correlated

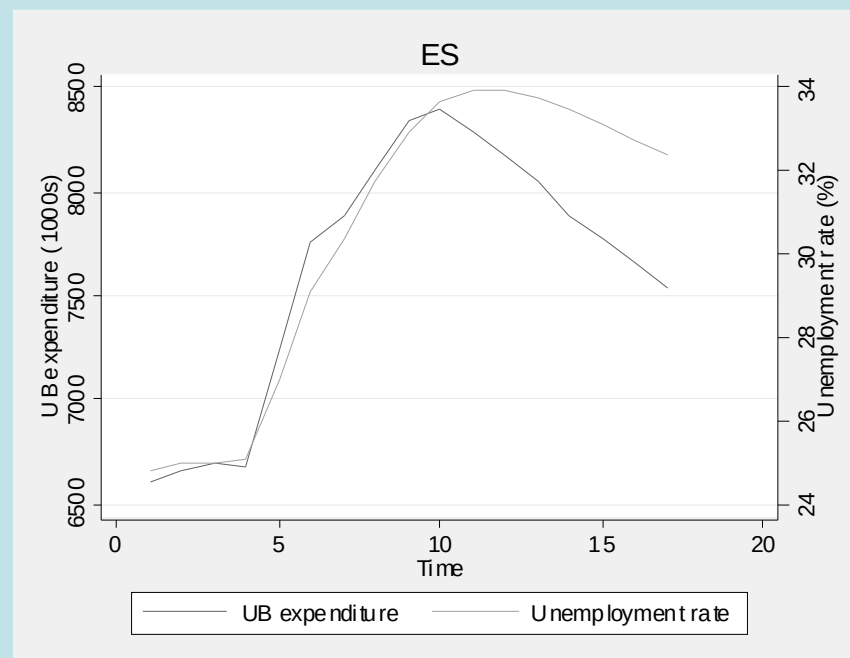
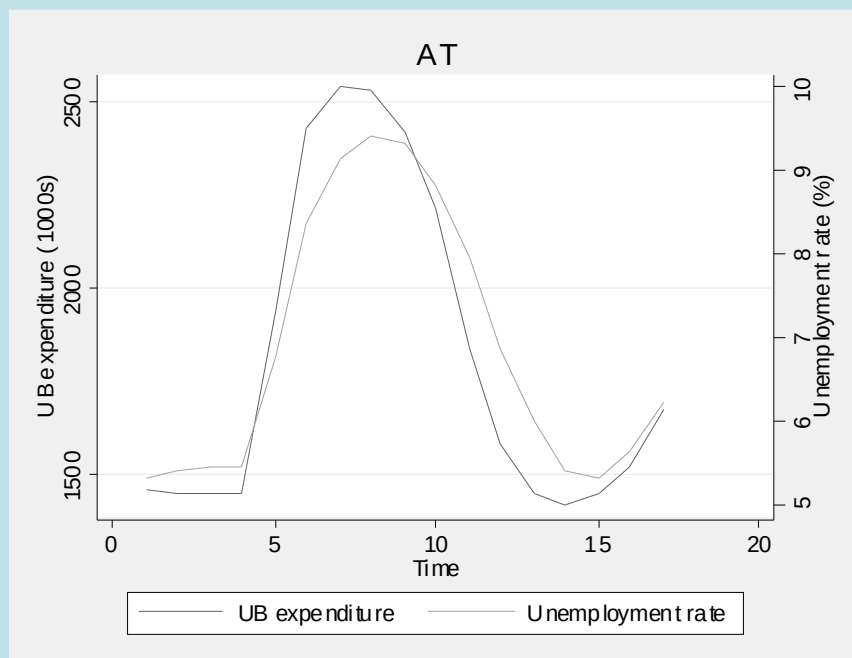
Predicting unemployment risk

- Probit regression on 2015 EU-SILC (DE 2014 EU-SILC, UK 2014/2015 FRS)
- Est sample: Active labour market status or positive earnings or UB; aged 15-64 included
- Dep variable: 1 if unemployed or inactive with positive UB or earnings
- Covariates: sex, age, education, earnings quintile, work experience, marital status, number of children in HH, Number of earners in HH, housing tenure
- Predict unemployment probability, adding a random term to avoid deterministic behaviour

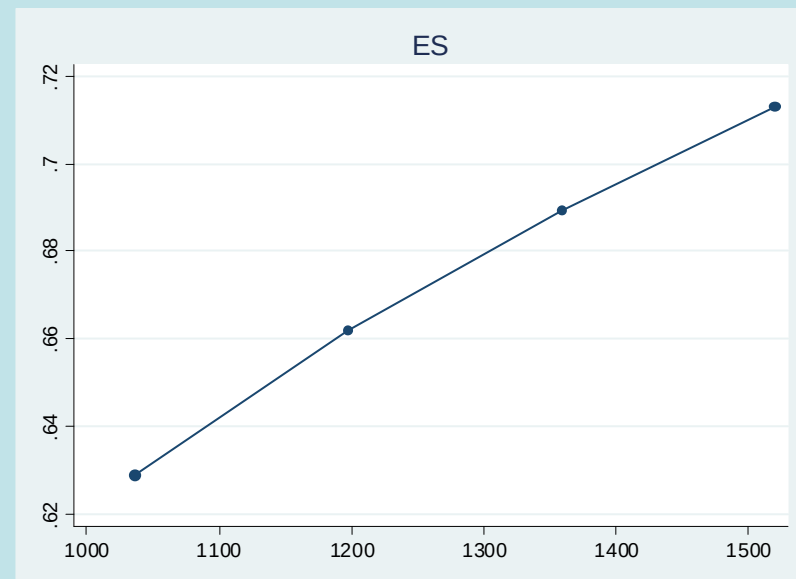
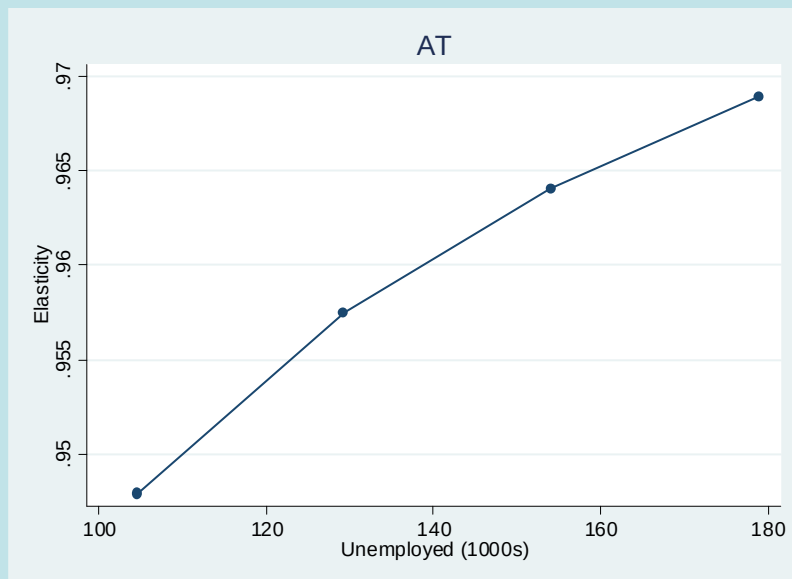
EUROMOD

- EUROMOD version H1.0+
- NRR add-on: simulates unemployment benefit entitlement for all individuals with positive earnings
- Individuals moved into unemployment one at the time through a recursive procedure
- New unemployed selected on the basis of macro conditions and predicted unemployment probabilities
- Prediction of UB expenditures follows

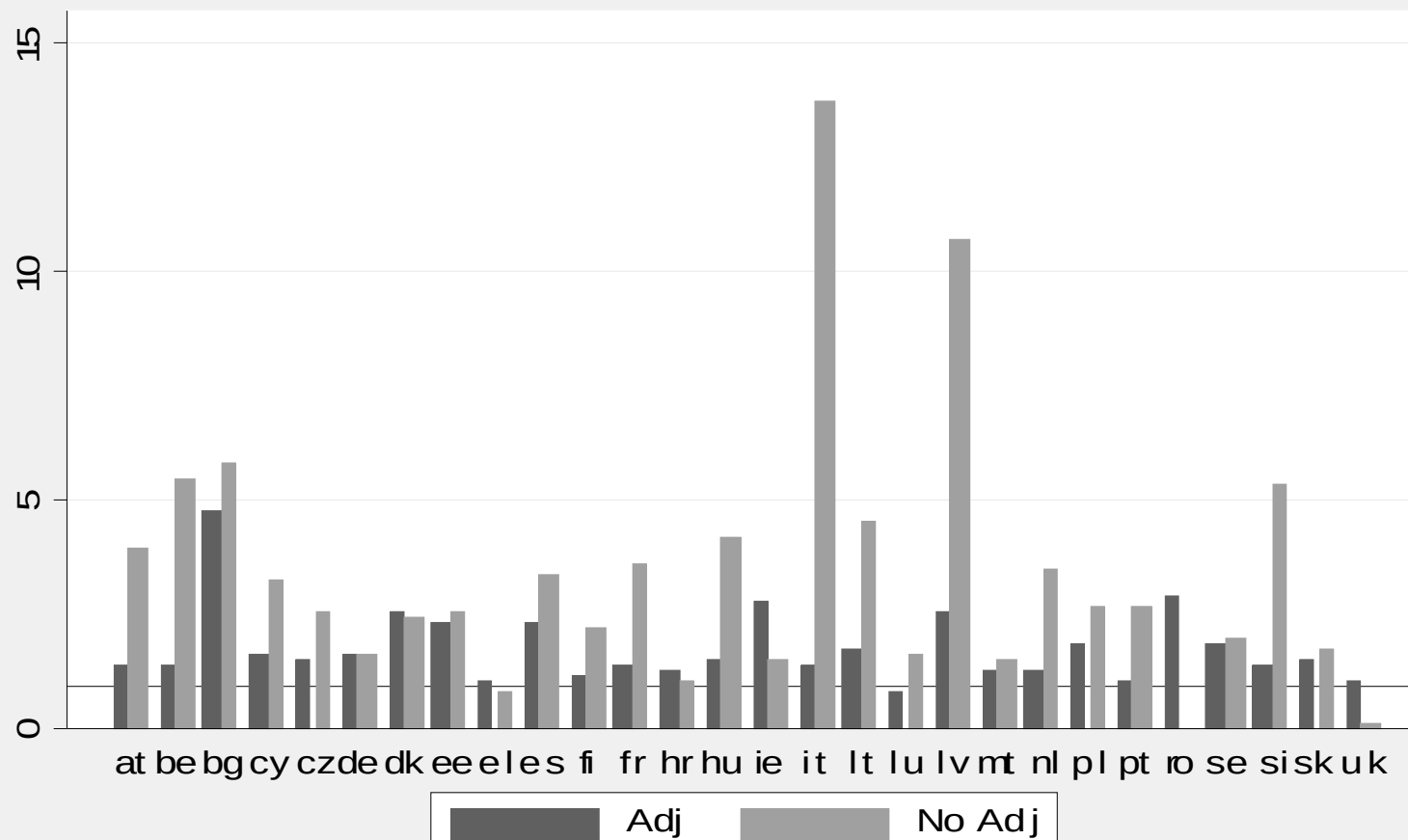
Predicted Unemployment spending (Very preliminary!)



Predicted Elasticity (Very preliminary!)



Validation: methodology to be improved



Open issues

Unemployment rate and UB expenditure: flow vs stock measures

	Gen	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
													NewUnempl		
1															
2															URQ1=2/12=16.7%
3															URQ2=4/12=33.3%
4															URQ3=5/12=41.7%
5															URQ4=1/12=8.3%
6															
7															UR Y=12/48=25%
8															
9															
10															UB UDB=26 Months
11															New Unempl=12*0.25=3
12															UB_New=19
															Adj Factor=26/19

Conclusions

- EUROMOD can be used to predict unemployment expenditures across the business cycle
- Open issues on the kind of information needed to optimise the simulations
- Methodology still work in progress

Extras



Predicting unemployment risk: regression tables

	AT	BE	BG	CY	CZ	DE	DK	EE	EL
Female	-0.032	-0.196***	-0.103**	-0.562***	-0.015	-0.173***	0.157***	0.063	-0.029
Age 55-64 (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Age 15-24	-0.746***	-0.937***	0.674***	-0.380***	-0.567***	-0.299***	0.242	-0.184	-0.689***
Age 25-34	-0.933***	-1.126***	0.175*	-0.756***	-0.958***	-0.494***	-0.186	-0.701***	-0.655***
Age 35-44	-0.951***	-1.149***	-0.122	-0.755***	-1.082***	-0.727***	-0.608***	-0.612***	-0.525***
Age 45-54	-0.799***	-0.880***	-0.318***	-0.530***	-0.952***	-0.677***	-0.546***	-0.532***	-0.359***
Tertiary Education (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Lower secondary or less	0.028	0.235***	0.243***	0.011	0.222**	-0.130**	0.139	0.319***	-0.057
Upper secondary non tertiary	0.067	0.102*	-0.082	0.053	-0.092	0.015	0.044	0.112**	0.009
No Earnings during the year (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
1st	0.054	-1.271***	-0.837***	-0.949***	-0.923***	-0.557***	0.477***	-0.191**	-2.345***
2nd	-1.067***	-2.148***	-2.011***	-1.829***	-2.126***	-1.433***	-0.699***	-1.108***	-2.608***
3rd	-1.599***	-2.334***	-2.702***	-2.577***	-2.479***	-1.801***	-1.682***	-1.367***	-3.083***
4th	-1.848***	-2.536***	-2.820***	-2.975***	-2.731***	-2.124***	-1.911***	-1.543***	-3.577***
5th	-2.023***	-2.681***	-2.878***	-3.078***	-2.770***	-2.271***	-2.069***	-1.600***	-3.507***
Work experience	-0.014***	-0.021***	0.026***	0.000	-0.011**	-0.008***	-0.001	-0.021***	-0.018***
Non married (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Married	-0.130**	-0.098*	-0.150***	-0.085	-0.142**	-0.149***	-0.007	-0.098**	-0.030
Number of children in HH	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
0 to 4	0.145***	0.063	-0.086	0.113**	0.156**	0.269***	-0.105	0.191***	0.046
5 to 9	-0.078	-0.022	-0.075	0.066	0.028	-0.094*	0.050	-0.041	-0.044
10 to 14	-0.102**	0.077	-0.050	0.104*	-0.007	-0.131***	0.002	0.030	-0.084**
Number of earner in HH	-0.058**	-0.124***	0.004	-0.024	-0.111***	-0.130***	-0.060**	-0.026	-0.042*
Non home owner	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Home owner	-0.055	-0.149***	0.122*	0.177***	-0.022	-0.125***	-0.140***	0.117**	-0.094**
_cons	1.300***	2.127***	0.656***	1.715***	1.769***	1.170***	0.431	0.535***	2.391***
N	7012	6354	6086	5918	8405	13016	7929	7488	14506
pseudo R ²	0.342	0.457	0.434	0.422	0.429	0.331	0.479	0.283	0.602

Predicting unemployment risk: regression tables

	ES	FI	FR	HU	IE	IT	LT	LU	LV
Female	-0.064**	-0.026	-0.082**	0.021	-0.149**	0.076***	0.012	-0.053	0.018
Age 55-64 (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Age 15-24	-0.528***	0.228***	0.252***	-0.900***	0.476***	-0.531***	-0.412***	-0.550***	-0.301**
Age 25-34	-0.695***	-0.276***	-0.370***	-1.104***	0.061	-0.707***	-0.807***	-0.778***	-0.540***
Age 35-44	-0.720***	-0.363***	-0.622***	-1.010***	0.056	-0.792***	-0.784***	-0.803***	-0.593***
Age 45-54	-0.502***	-0.435***	-0.723***	-0.768***	-0.018	-0.730***	-0.510***	-0.900***	-0.455***
Tertiary Education (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Lower secondary or less	0.137***	0.065	0.079*	0.180**	0.088	0.294***	0.302***	-0.272***	-0.040
Upper secondary non tertiary	0.105***	-0.080**	0.123***	0.106*	0.046	0.157***	0.171***	-0.142*	0.011
No Earnings during the year (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
1st	-0.907***	-0.222***	-0.783***	-0.435***	-2.465***	-1.127***	-0.468***	-0.939***	-0.678***
2nd	-1.594***	-1.285***	-1.632***	-1.611***	-3.110***	-1.823***	-1.585***	-1.858***	-1.682***
3rd	-2.211***	-2.213***	-2.276***	-2.193***	-3.555***	-2.202***	-1.981***	-1.940***	-2.134***
4th	-2.644***	-2.580***	-2.453***	-2.331***	-3.913***	-2.718***	-2.127***	-2.131***	-2.390***
5th	-2.713***	-2.902***	-2.485***	-2.284***	-3.712***	-2.924***	-2.137***	-2.441***	-2.576***
Work experience	-0.015***	0.003**	0.011***	-0.018***		-0.015***	-0.023***	0.009*	-0.017***
Non married (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Married	-0.100***	-0.115***	-0.063*	-0.105**	-0.007	0.009	-0.194***	0.005	-0.010
Number of children in HH	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
0 to 4	-0.020	0.218***	0.053	0.158***	0.100	-0.026	-0.284***	0.091	0.180***
5 to 9	-0.029	0.036	-0.056	-0.007	-0.102*	-0.074**	-0.059	-0.091	-0.041
10 to 14	-0.040	-0.035	-0.005	-0.029	-0.022	-0.029	0.005	-0.065	0.048
Number of earner in HH	-0.030*	-0.022	-0.084***	0.018	-0.017	-0.001	-0.017	-0.023	-0.022
Non home owner	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Home owner	0.019	-0.096**	-0.079**	-0.140**	-0.149**	0.015	-0.184**	-0.109*	-0.096*
_cons	1.855***	1.203***	1.057***	1.492***	1.624***	1.670***	1.473***	1.170***	1.426***
N	16557	15276	12880	8521	5713	20540	5473	4363	6972
pseudo R ²	0.381	0.458	0.347	0.369	0.597	0.362	0.379	0.258	0.341

Predicting unemployment risk: regression tables

	MT	NL	PL	PT	RO	SE	SI	SK	UK
Female	-0.184***	-0.032	-0.015	-0.158***	-0.307***	-0.039	0.179***	-0.072	-0.174***
Age 55-64 (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Age 15-24	-0.273*	0.189**	-0.611***	-1.328***	-0.188	1.306***	-0.750***	-0.815***	-0.607***
Age 25-34	-0.883***	-0.592***	-0.675***	-1.234***	-0.515***	0.611***	-1.581***	-1.519***	-1.038***
Age 35-44	-1.187***	-0.606***	-0.656***	-1.081***	-0.575***	0.088	-1.573***	-1.421***	-0.916***
Age 45-54	-1.039***	-0.562***	-0.401***	-0.648***	-0.458***	-0.157**	-1.104***	-0.922***	-0.514***
Tertiary Education (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Lower secondary or less	-0.088	0.148***	-0.160***	0.176***	-0.337***	0.318***	0.205***	0.511***	0.428***
Upper secondary non tertiary	0.186**	0.134***	0.134***	0.044	-0.077	-0.039	0.103**	-0.097*	0.213***
No Earnings during the year (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	
1st	-0.667***	0.213***	-0.305***	-1.077***	-1.683***	0.288***	-0.881***	-1.073***	
2nd	-2.262***	-1.031***	-1.133***	-1.961***	-2.340***	-0.606***	-2.174***	-2.056***	
3rd	-2.862***	-1.624***	-1.401***	-2.223***	-2.665***	-1.287***	-3.024***	-2.303***	
4th	-3.306***	-1.715***	-1.512***	-2.095***	-2.482***	-1.562***	-3.469***	-2.257***	
5th	-3.050***	-1.814***	-1.588***	-2.306***	-2.584***	-1.495***	-3.631***	-2.894***	
Work experience	-0.002	-0.002	-0.024***	-0.033***	-0.019***	0.025***	-0.033***	-0.034***	-0.054***
Non married (Ref.)	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Married	0.004	-0.007	-0.098***	-0.152***	-0.080	0.007	-0.125***	-0.125**	-0.015
Number of children in HH	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
0 to 4	0.007	-0.023	-0.046	0.041	0.266***	-0.169***	-0.261***	0.060	-0.095**
5 to 9	-0.006	-0.060	-0.058*	0.007	0.050	-0.053	0.001	0.075	0.036
10 to 14	-0.059	-0.032	-0.064**	0.026	-0.330***	0.010	-0.007	-0.028	-0.009
Number of earner in HH	-0.025	-0.058***	-0.089***	-0.049**	-0.126***	-0.012	0.048***	-0.004	-0.950***
Non home owner	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Home owner	-0.008	-0.129***	-0.316***	-0.101**	-0.468***	-0.152***	0.020	-0.021	-0.129***
_cons	1.763***	0.596***	0.882***	2.184***	1.806***	-0.967***	3.043***	2.329***	1.094***
N	5463	13504	16485	10528	7445	7836	14961	8248	19936
pseudo R ²	0.515	0.399	0.250	0.405	0.509	0.398	0.586	0.441	0.366