The European Commission's science and knowledge service

Joint Research Centre

European Commission

The role of automatic stabilisers in the European Union business cycle

Vanda Almeida, Salvador Barrios, Francesca D'Auria,
Alberto Tumino, Janos Vargas

EUROMOD Research Workshop
Milan, 26 September 2019

European Commission

Outline

- Introduction
- Data and Methods
- Preliminary results
- Conclusions and next steps

Introduction

- After the Great Recession growing interest in improving MSs' resilience against idiosyncratic shocks
- Role of fiscal policy
- Discretionary measures vs automatic stabilisers
- Automatic stabilisation: extent to which country tax and benefit systems automatically smooths the impact of shocks
- Main question: how do different components of the tax-benefit system stabilise the economy?

Introduction

- Stabilisation property of a proportional income tax: an intuition
  - MY=100 t=0.2 T=20 Y=80
  - Shock
  - MY=50 t=0.2 T=10 Y=40
  - A shock of 50 to MY reduced Y "only" by 40. 10 is absorbed by the tax-benefit system

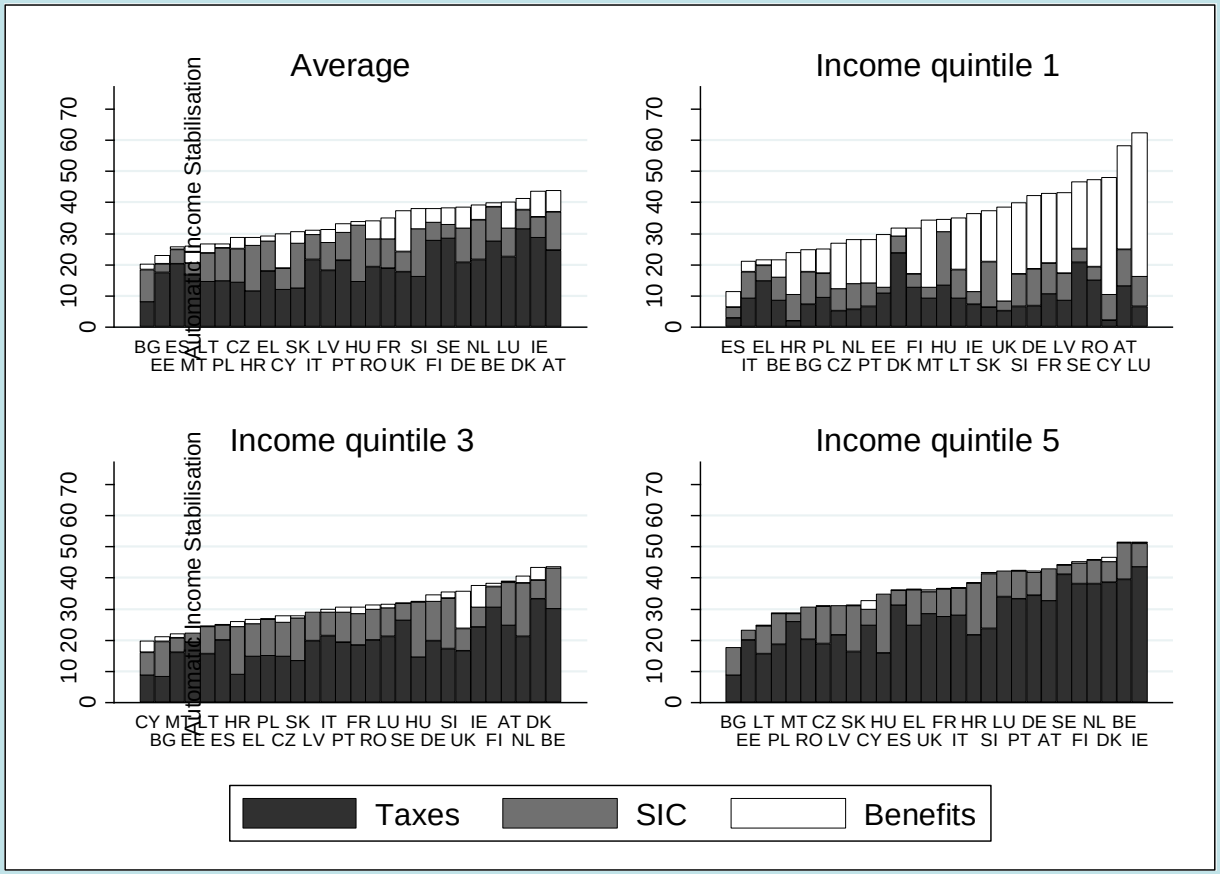
Introduction

- The work extends Euromod-based Automatic Stabilisation Indexes on income and demand (Barrios and Tumino 2017; Dolls et al. 2012)
- Interaction micro-macro model allows to estimate the effectiveness of automatic stabilisers in smoothing aggregate demand and output
- Micro model: Euromod
- Macro model: QUEST, DSGE model run by the EC
- Link: Extends Barrios et al. 2019 dynamic scoring by estimating tax functions

Data and methods

- Aim: analyse the evolution of key macroeconomic variables at different degree of automatic stabilisation
- Steps:
  1. Derive calibration parameters for QUEST using EUROMOD
  2. Switch off sequentially Employer SIC, Employee SIC, PIT and re-compute key parameters
  3. Shock QUEST and analyse the evolution of GDP at the baseline and when automatic stabilisers are shut down

Data and methods: Income Stabilisation Coefficient



Source: Barrios and Tumino 2017

European Commission

Data and Methods

- Link EUROMOD and QUEST through:
  1. Tax functions
  2. Labour Supply elasticity and predicted participation rates, by skills
  3. Average earnings, by skills
- EUROMOD Version i1.0+
- Policy system 2018, SILC 2016, IT (ES, DE, FR)
- Macro Shock in QUEST: Italy 2012, domestic demand shock
- 2 benchmarks: government budget constant in absolute term and as a share of GDP

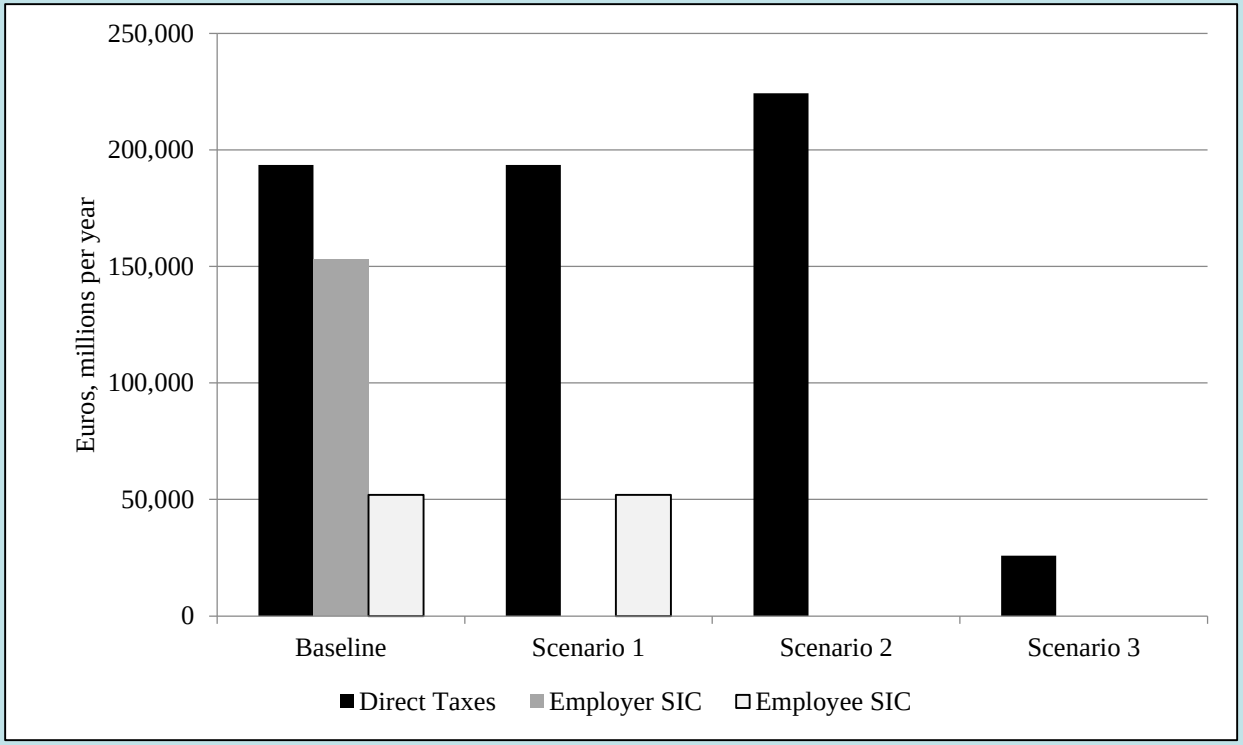
Data and Methods: Tax Functions

- Estimation sample: individuals reporting positive employment income as sole source of market income and not receiving benefits or pensions
- 3 functional forms for average tax rates (Guner et al. (2014)
  1. *Log specification*: $t(y) = \alpha + \beta\, log(y)$
  2. *HSV specification:* $t(y) = 1 - \lambda y^{-\tau}$
  3. *Power specification:* $t(y) = \delta + \varphi y^{\varepsilon}$
- Separate estimations for employers and employees

Data and Methods

- Labour supply elasticities and participation rates derived using a discrete labour supply model running on EUROMOD
- Number of employed and unemployed, as well as gross wages by skill based on SILC

Results: Scenario description



European Commission

Results: Tax Functions

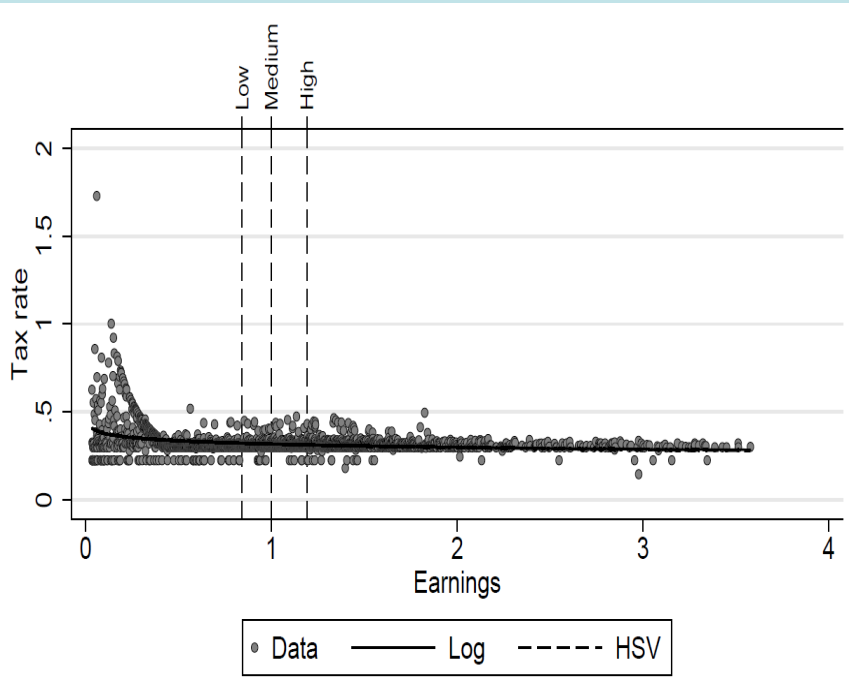
Table 1: Tax function parameters, Italy

		EMPLOYERS	EMPLOYEES		
Specification		**Baseline**	**Baseline**	**Scenario 1**	**Scenario 2**
Log	**α**	0.317*** (0.001)	0.269*** (0.001)	0.269*** (0.001)	0.204*** (0.001)
	β	-0.0262*** (0.001)	0.0833*** (0.001)	0.0833*** (0.001)	0.106*** (0.001)
	AIC	-11347.8	-11342.4	-11342.4	-11580.1
	BIC	-11335.4	-11330.0	-11330.0	-11567.7
	N	3729	3729	3729	3817
HSV	**λ**	0.683*** (0.001)	0.730*** (0.001)	0.730*** (0.001)	0.796*** (0.001)
	τ	-0.0433*** (0.002)	0.0957*** (0.002)	0.0957*** (0.002)	0.113*** (0.001)
	AIC	-11035.2	-11305.6	-11305.6	-11556.2
	BIC	-11022.8	-11293.1	-11293.1	-11543.7
	N	3729	3729	3729	3817
Power	**δ**	x	0.0989*** (0.005)	0.0989*** (0.005)	-0.0639*** (0.007)
	φ	x	0.161*** (0.005)	0.161*** (0.005)	0.259*** (0.008)
	ε	x	0.726*** (0.023)	0.726*** (0.023)	0.548*** (0.017)
	AIC	x	-12959.0	-12959.0	-13414.6
	BIC	x	-12940.3	-12940.3	-13395.8
	N		3729	3729	3817

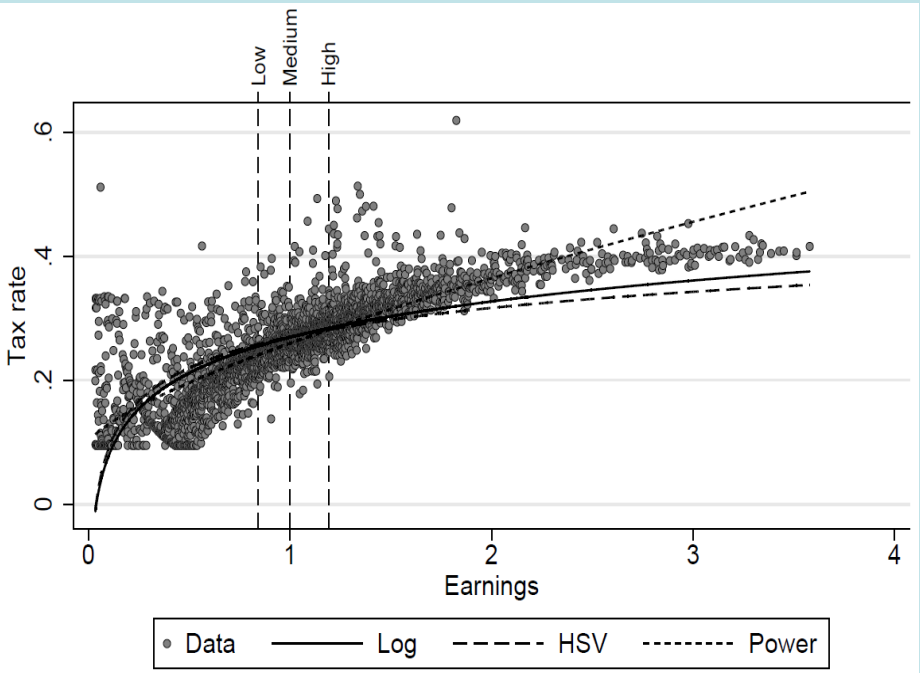
Standard errors in parentheses $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Results: tax functions

Baseline: Employer



Baseline: Employees

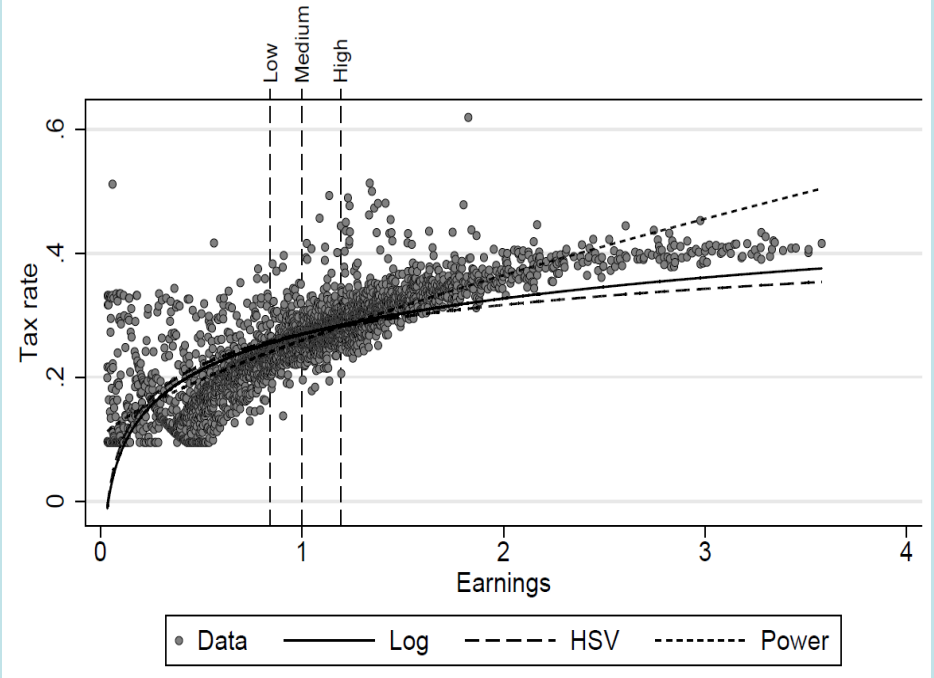


European Commission

Results: tax functions

Scenario 1: Employer →N/A

Scenario 1: Employees

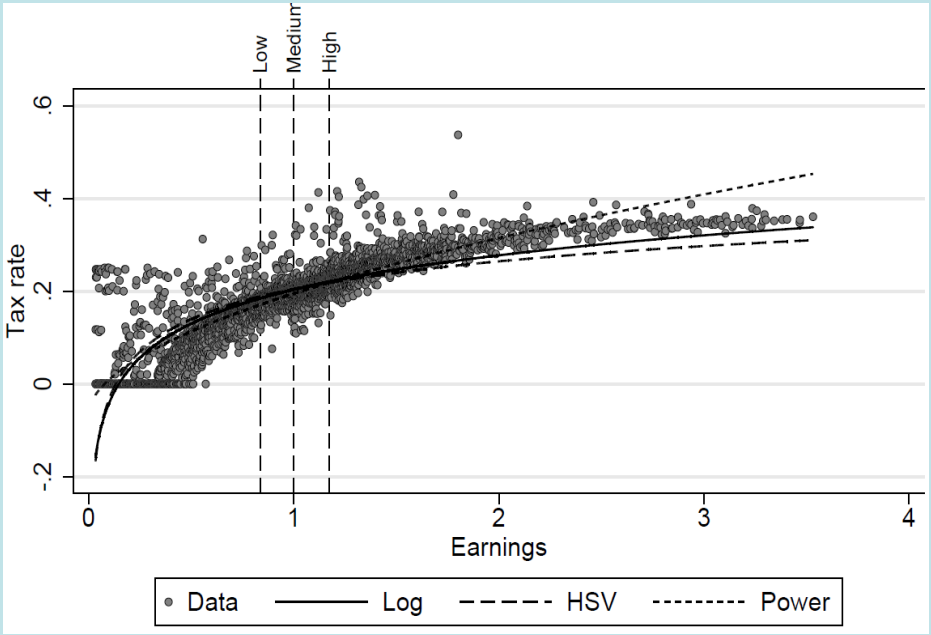


European Commission

Results: tax functions

Scenario 2: Employer →N/A

Scenario 2: Employees



European Commission

Results: other parameters

Parameter	Baseline
Average elasticity of labour supply wrt wages	0.28160397
Elasticity of labour supply wrt wages high skilled	0.12239733
Elasticity of labour supply wrt wages medium skilled	0.23541096
Elasticity of labour supply wrt wages low skilled	0.42686641
Exogenous variables in QUEST	
Predicted number of individuals supplying zero hours, high skilled	3,987,933
Predicted number of individuals supplying zero hours, medium skilled	10,261,055
Predicted number of individuals supplying zero hours, low skilled	8,596,522
Endogenous variables in QUEST (1st guess)	
Number employed high skilled	3,961,910
Number employed medium skilled	8,139,715
Number employed low skilled	5,188,099
Number unemployed high skilled	655,150
Number unemployed medium skilled	2,022,939
Number unemployed low skilled	2,245,469
Average gross real wage high skilled	37,100
Average gross real wage medium skilled	27,204
Average gross real wage low skilled	21,514

Macro effects: caveats

- QUEST baselines calibrated using the power tax function for employees and a constant tax rate for employers.
- Similar to Guner et al. (2014), results compare baseline with scenario where all automatic stabilisers are shut-down. No intermediate steps.
- Automatic stabilisers switched off include: pit, sic, consumption taxes, corporate income tax and unemployment benefits are switched off.

Results: QUEST

Role of automatic stabilisers (Baseline vs Guner et. al (2014) specification)

	Percentage change			Percentage smoothing	
	Stabilisers on	Benchmark budget 1	Benchmark budget 2	Benchmark 1	Benchmark 2
Real GDP	-2.28	-2.74	-3.12	0.17	0.27
Value added T	-1.94	-2.12	-2.34	0.08	0.17
Value added NT	-2.08	-2.66	-3.12	0.22	0.33
Domestic private demand	-4.81	-5.83	-5.58	0.18	0.14
Private consumption	-3.75	-4.98	-4.69	0.25	0.20
Private investment	-10.40	-10.31	-10.28	-0.01	-0.01

Percentage Smoothing=1-Change(Stabilisers ON)/Change(Stabilisers OFF)

Results

- Using log specification and scenario 3 roughly half of the percentage smoothing (Results not available yet)
- Taxes and social insurance contributions significantly smooth the effect of shocks on the business cycle
- The size of the smoothing effect depends on the assumptions about constant government budget
- Domestic private demand and private consumption also respond to automatic stabilisers

Next steps

- Add progressive shut down of automatic stabilisers in QUEST
- Improve sample selection
- Calibrate parameter on liquidity constrained individual in QUEST using EUROMOD
- Study trajectory to Steady State in QUEST
- Repeat the exercise for Germany, France and Spain