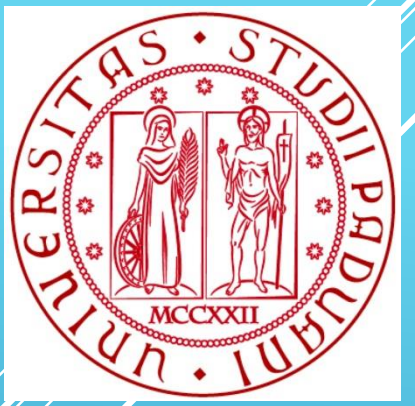

Essay on paper

Time use during recession

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Economic Policy Course – A.A. 2015/2016
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Presentation Outline

- Work Objectives
- Dataset Structure
- Descriptive Statistics
- Detrending Strategy
- Regression Outcome
- Model Application
- Conclusions

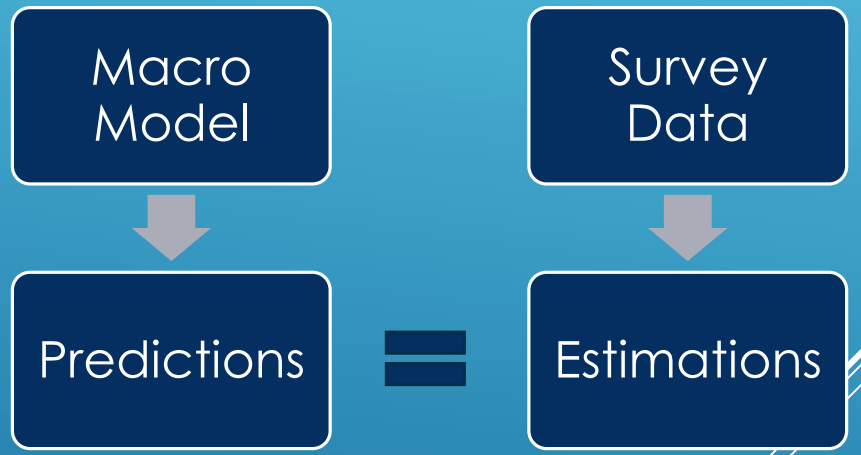
Work Objectives

Main objective

Study time investment decision during recessionary periods

Secondary objective

Test macromodels on home production and fine tuning of key parameters



Dataset

American Time Use Survey

(ATUS by U.S. Bureau of Labor Statistics)

24 hour daily diaries

From 2003 to 2010

400 Categories

76'203 individuals

Age 18-65

Demographic and Economic data from Current Population Survey

time aggregates:

2003-05

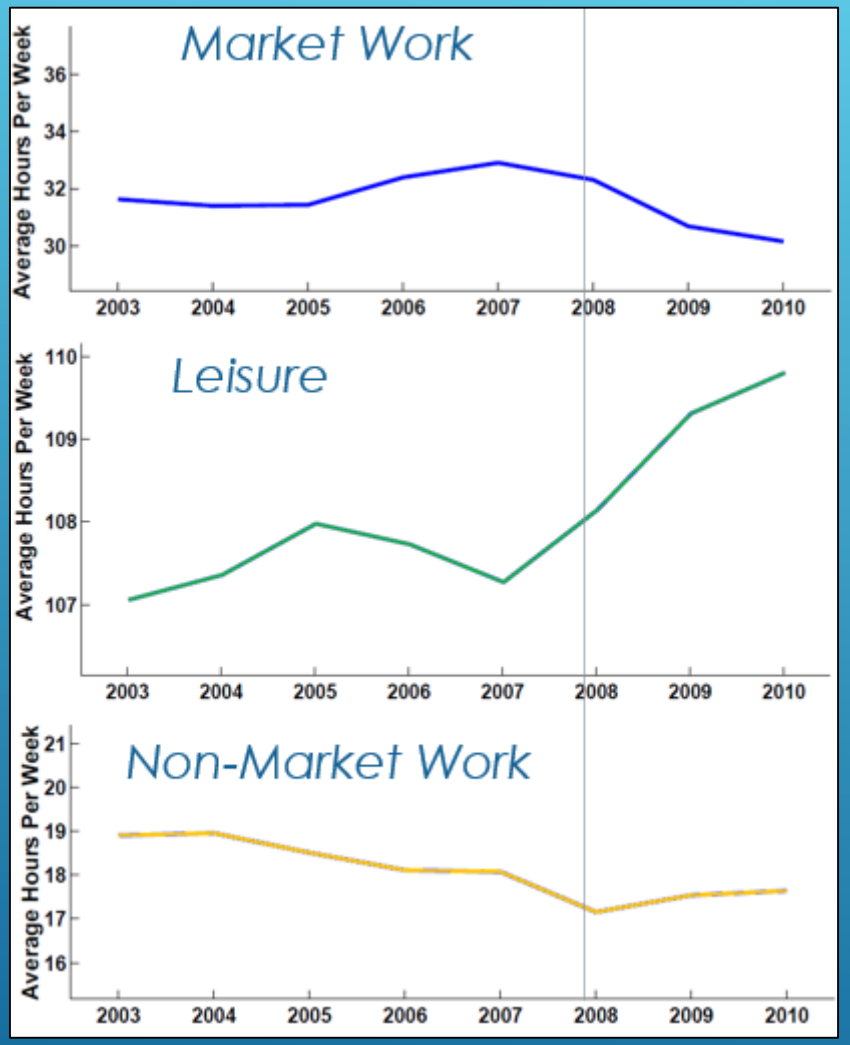
2006-08

2009-10

Data rearranged in:

Market Work	•Main job, secondary job, overtime, trasportation time included.
Non-Market Work	•Home, vehicles and garden management and mainteniance, chores.
Leisure	•Sleeping, Eating, Personal care, Social time, entertainment, TV Watching.
Job Search	•Interviews, information gathering.
Child Care	•Time spent with related children.
Other Income	•Remunerative hobbies, babysitting, food-preparing.
Other	•Education, Religion, Medical care

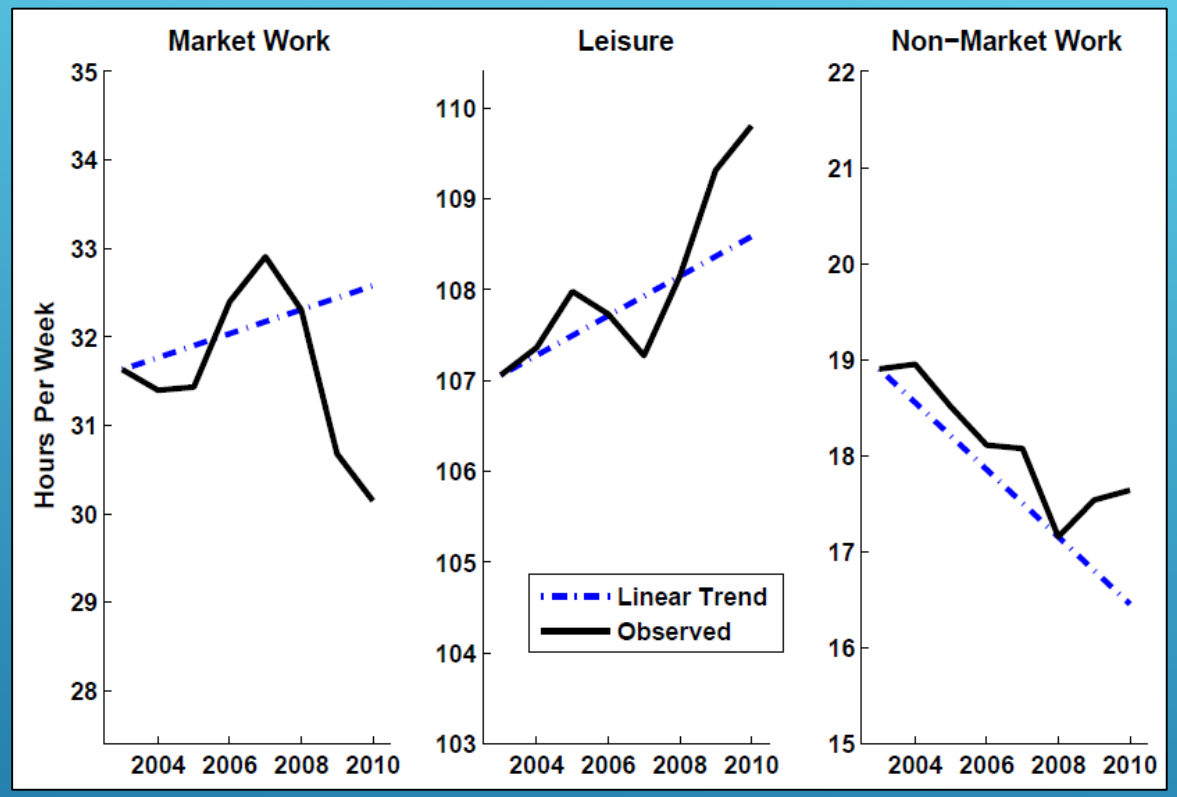
Descriptive Statistics



Time Allocation	2003-05 Average (1)	2006-08 Average (2)	2009-10 Average (3)	Difference (C) 09-10 vs. 06-08 (5)
Market Work	31.48	32.53	30.41	-2.14
Other Income-Generating Activities	0.16	0.16	0.24	0.07
Job Search	0.20	0.27	0.42	0.14
Child Care	4.84	4.57	4.47	0.01
Non-Market Work	18.78	17.78	17.58	-0.09
Leisure	107.46	107.71	109.55	1.69
Other	5.03	4.95	5.29	0.30

- Foregone Market Work hours appear allocated to Leisure
- Cyclic Variation in Market hours
- Leisure time spikes during recession
- Trends may obscure business cycle effects

Detrending Strategy



- Leisure has an upward bias
- Non-Market Work has a downward bias

Regression Model:

$$\Delta\tau_{st}^{j} = \alpha^{j} - \beta^{j}\Delta\tau_{st}^{market} + \gamma^{j}D_t + \delta^{j}\Delta X_{st} + u_{st}^{j}$$

$\Delta\tau_{st}^{j}$	*Change in time allocation for category j, in state s at time t*
$\Delta\tau_{st}^{market}$	*Change in time allocation for market work, in state s at time t*
D_t	Time aggregates dummy (3 periods)
ΔX_{st}	Economic and demographic controls, at state level

- Business cycle differences across state will remove the aggregate trend
- ASSUMPTIONS: Changes in market work are different across states; absence of state specific trends
- Regression Beta is not a structural parameter, it will indicate the allocation of Market Work hours to the j-th category as a measuring device

Regression Outcome

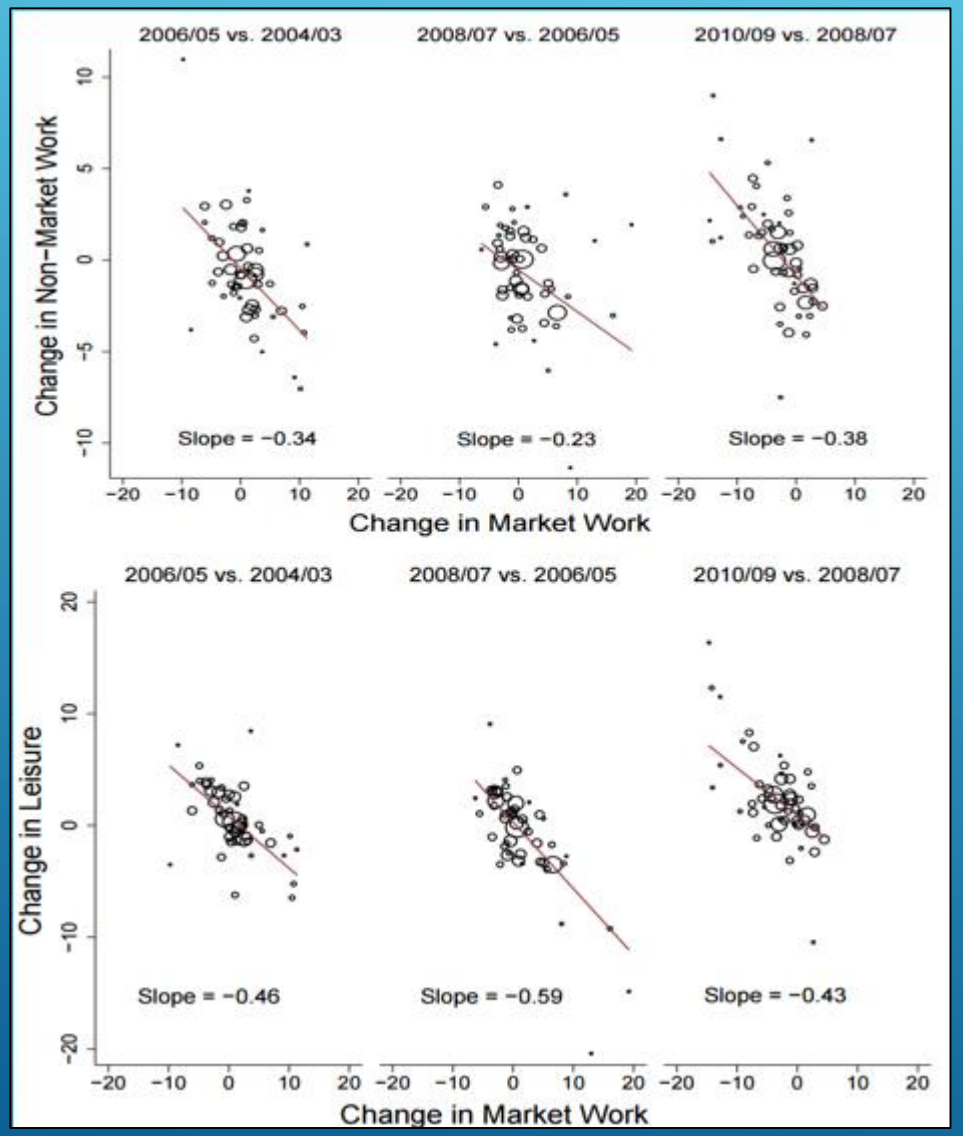
Time Allocation	Base (1)	Demo (2)	Demo+Econ (3)
Other Income-Generating Activities	0.56	0.82	0.91
Job Search	0.97	0.73	0.74
Child Care	5.52	4.98	4.45
Non-Market Work	31.30	29.68	28.93
- Core Home Production	12.61	11.80	10.96
- Home Ownership Activities	6.82	7.47	7.02
- Obtaining Goods and Services	7.95	6.61	7.41
- Others Care	3.91	3.78	3.53
Leisure	49.76	51.09	52.05
- TV Watching	12.19	12.35	13.40
- Socializing	3.85	3.24	2.47
- Sleeping	20.55	19.42	19.33
- Eating and Personal Care	-2.28	-1.81	-1.38
- Other Leisure	15.44	17.89	18.22
Other	11.86	12.68	12.90

Time Use (Foregone Market Work Hours)	**Before Detrend**	**After Detrend**	**Elasticity of substitution** (on pooled results w.r.t. Market Work = -Δ1%)
Non-Market Works (11% of total time)	**0%**	**33%**	**Δ0.55%**
Leisure (65% of total time)	**80%**	**50%**	**Δ0.15%**
Job Search	**6.5%**	**3.3%**	**Δ0.1%**
Others (Education)	**1%**	**5%**	**Δ0.37%**
Others (Medical Care)	**1%**	**5%**	**Δ1.5%**

$$\varepsilon_j = \left(\frac{\Sigma_t \Sigma_s w_s \tau_{st}^{market}}{\Sigma_t \Sigma_s w_s \tau_{st}^{j}}\right)\beta^j$$

- At business cycle frequencies, on average, individual prefer to allocate their time in Home Production rather than Leisure
- Increase in Other's elasticity indicates a lower cost-opportunity of time during recessions

Regression Outcome



- Subperiods comparison underlines the joint dynamics of Leisure and Non-Market works through the business cycle
- Expansionary periods (middle) show a preference for Leisure in foregone Market work hours allocation
- Recessionary periods (right) show a preference for Non-Market Work in foregone Market work hours allocation

Model Application

Home production model by Nenhabib, Rogerson and Wight's

The model describes the joint dinamics of labour supply and consumption over time	
Initial Conditions:	
Elasticity of substitution between market goods and home goods	ε
Exogenous shocks	Z_t^j
Time allocation:	
Market Production	N_t^m
Home Production	N_t^h
Leisure	L_t
Capital allocation:	
Market	K_{t-1}^m
Home	K_{t-1}^h
Total investment	X_t

Production functions:

$$C_t^m = [\exp(Z_t^m)\,(K_{t-1}^m)^{\alpha_m}(N_t^m)^{1-\alpha_m}] - X_t$$

Cobb-Douglas production function for market goods

$$C_t^h = [\exp(Z_t^h)\,(K_{t-1}^h)^{\alpha_h}(N_t^h)^{1-\alpha_h}]$$

Cobb-Douglas production function for home goods

Utility function:

$$\max U(C_t, L_t)$$

Maximize the utility, of the rational individual over time, given by good consumption and leisure, under the constraints.

Constraints:

$$C_t = [(1-\alpha)\,(C_t^m)^{1-\varepsilon} + \alpha(C_t^h)^{(1-\varepsilon)}]^{(\frac{1}{1-\varepsilon})}$$

Aggregate consumption: adverse selection between home goods and market goods defined by elasticity

$$L_t + N_t^m + N_t^h = 1$$

Individual total time allocation = 1

Model Application

Since the original model has a different definition of Leisure, two versions are simulated:

- Version 1: Leisure excludes sleeping, eating and personal care. (Original model).
- Version 2: Leisure includes sleeping, eating and personal care.

Model is calibrated using the time allocation results from the regression on survey data:

	Version 1	Version 2
L_t	41.3%	68.6%
N_t^m	37.2%	20%
N_t^h	21.5%	11.4%

Generated time series are used to predict time allocation using the regression:

$$\Delta N_{st}^h = \alpha^h - \beta^h \Delta N_{st}^m + u_{st}^h$$

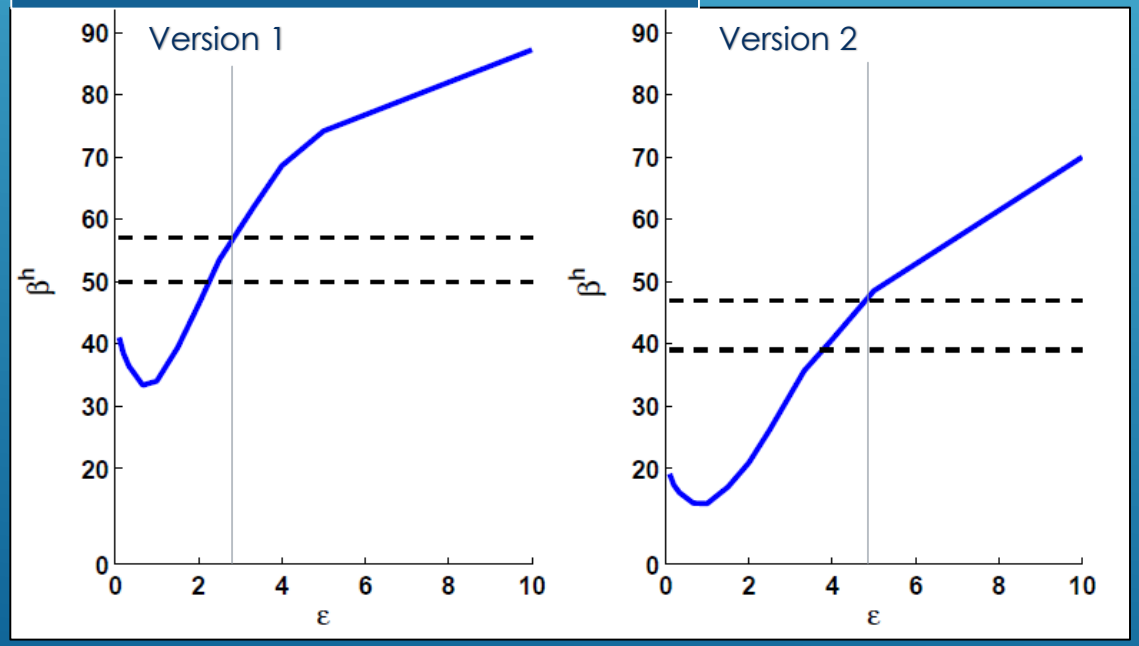
$$\Delta L_{st} = \alpha^l - \beta^l \Delta N_{st}^m + u_{st}^l$$

$\beta^h + \beta^l = 1$

Model Application

The test is performed using the standard calibration parameters	Simulated data results $\varepsilon = 2$	Simulated data results $\varepsilon = 5$	Decrease in market work allocated to Home production. Survey Evidence (pooled sample)	Decrease in market work allocated to Home production. Survey Evidence (recession sample)	Elasticity ε needed to match survey data
Version 1 (Leisure excludes sleep, eating and personal care)	$\beta^h = 46\%$	$\beta^h = 74\%$	50%	57%	$\varepsilon = 2.5$
Version 2 (Leisure excludes sleep, eating and personal care)	$\beta^h = 20\%$	$\beta^h = \underline{48\%}$	39%	<u>47%</u>	$\varepsilon = 4$

Elasticity vs % of foregone mkt hours allocated to home production



- Sleep, eating and personal care are among the most unelastic components of Leisure
- Home production's Elasticity of substitution w.r.t. Market Work raises during recession times

Conclusions

- Long time trends obscure the business cycle effect in time allocation decision
- Bulk of the foregone Market Work time is allocated in Leisure (Sleeping and personal care are included)
- During recession times Home Production tends to become a more elastic mean of substitution with respect to Leisure for foregone Market Work hours

1. High allocation in Leisure reflects the primary nature of the needs included in the category. Also, during higher employment times, time-cost opportunity is high, and many activities (such as medical care included in Leisure) are postponed.
2. Recession's uncertainties force the individual to switch his preferences: investing time and wealth to obtain Home Production return's defines them as more tangible and reassuring than Leisure's.
3. Need to Produce: during higher unemployment times Home Production becomes the main way in which the individual can keep using his own productivity and skills for a return.

Thanks for your attention.