Structural Transformation and the Deterioration of European Labor Market Outcomes

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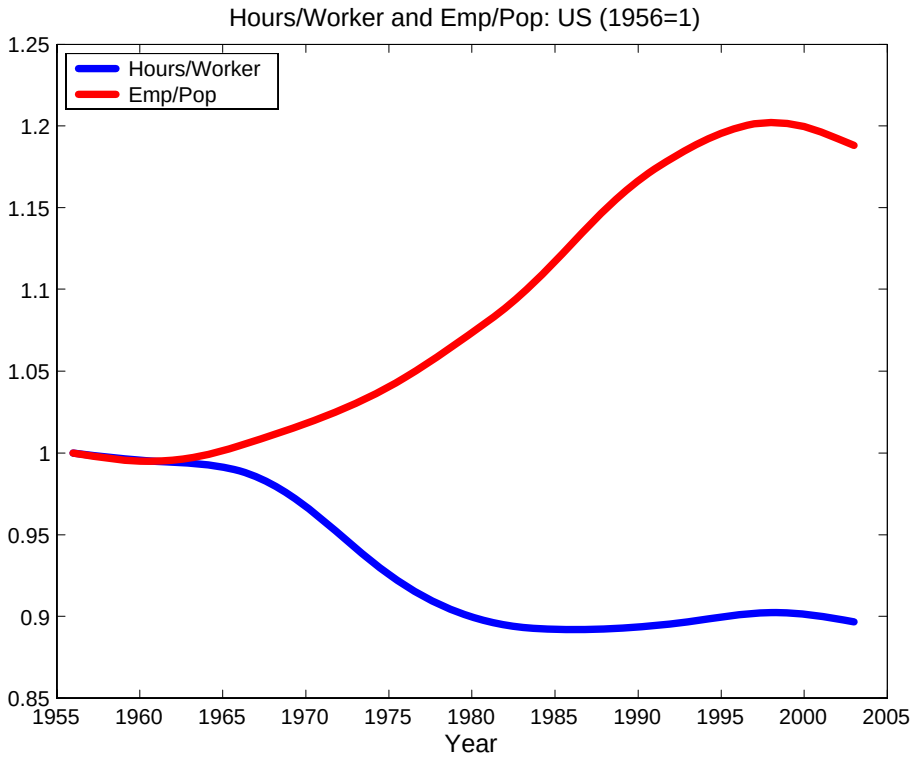
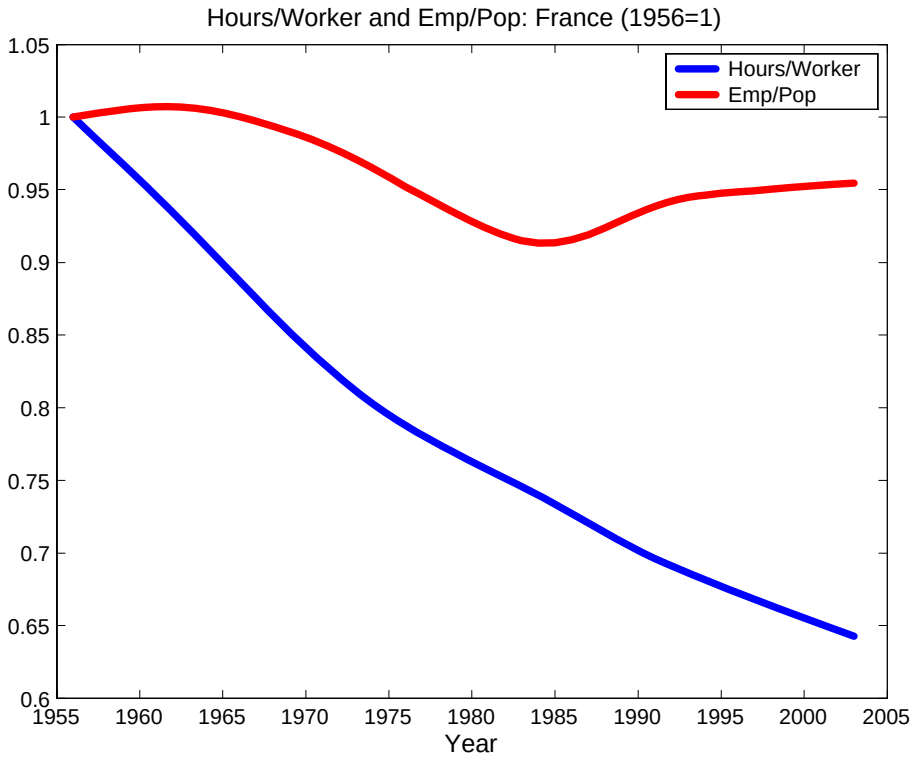
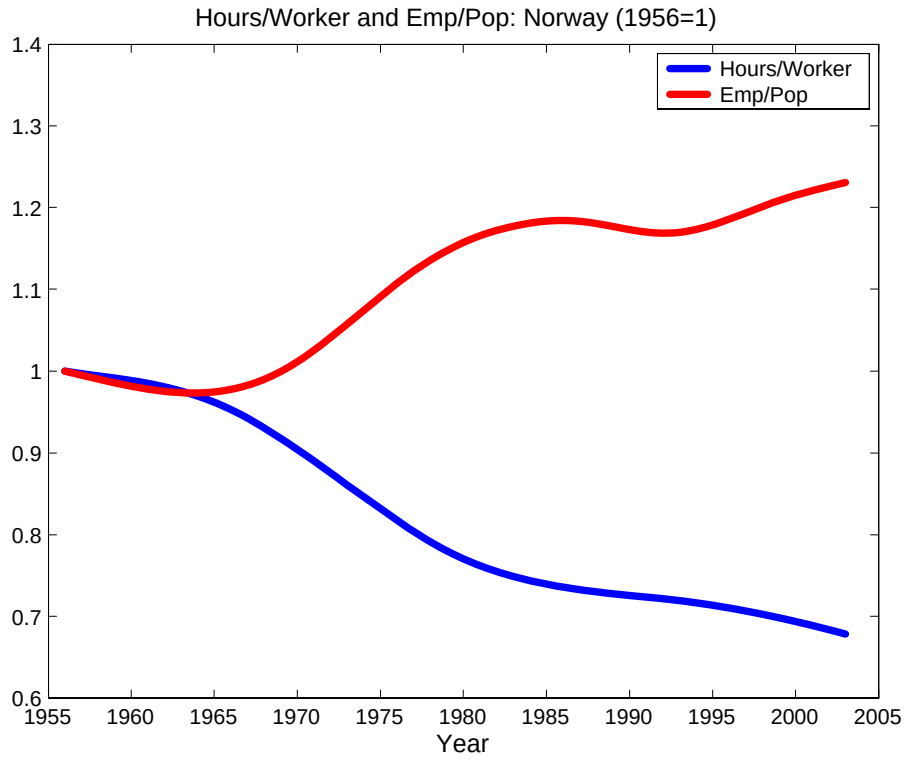
Background: Patterns in Disaggregated Data

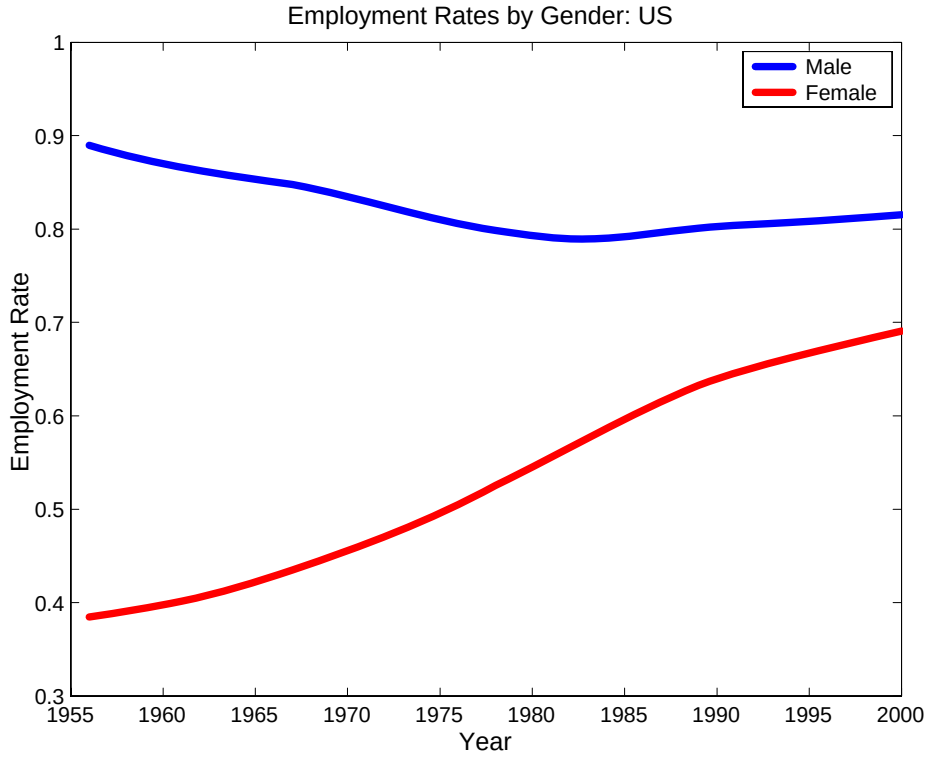
I disaggregate on two dimensions:

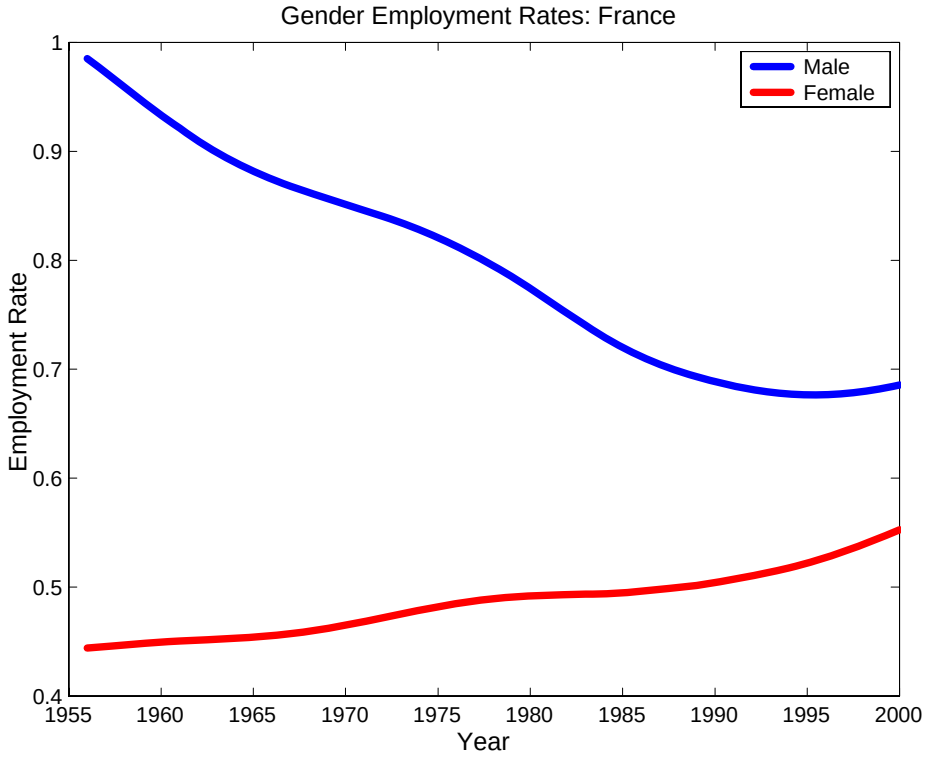
1. Total hours into components of employment and hours per worker
2. Employment into employment by gender

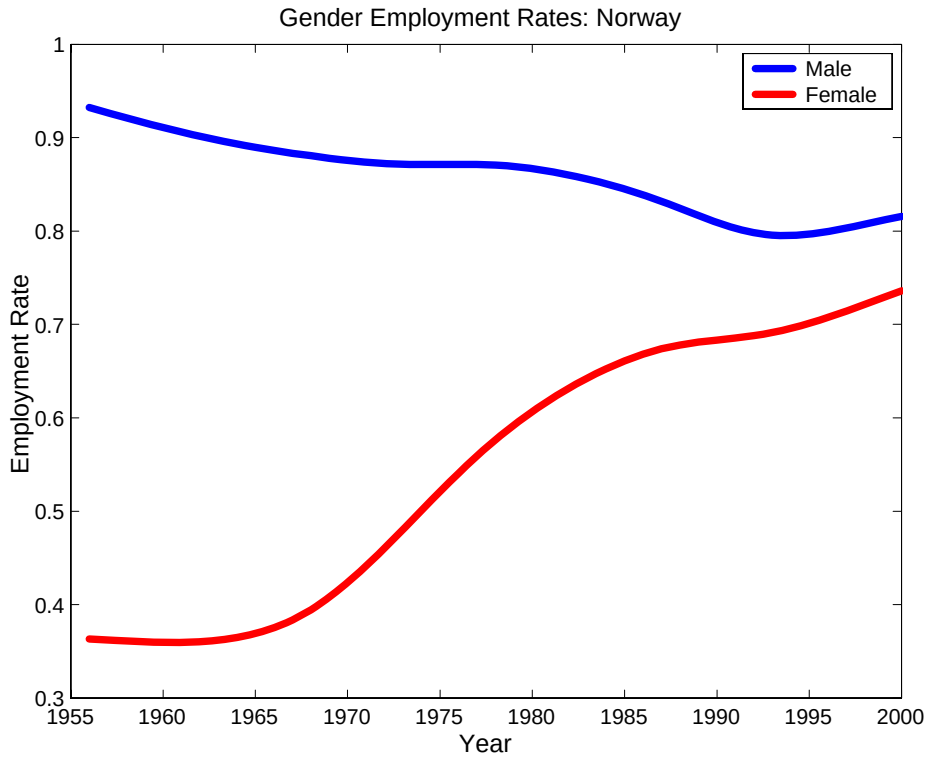

Hours/Worker and Emp/Pop: US (1956=1)
Hours/Worker
Emp/Pop
1.25
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year


Hours/Worker and Emp/Pop: France (1956=1)
Hours/Worker
Emp/Pop
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year


Hours/Worker and Emp/Pop: Norway (1956=1)
Hours/Worker
Emp/Pop
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year


Employment Rates by Gender: US
Male
Female
Employment Rate
Year
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000


Gender Employment Rates: France
Male
Female
Employment Rate
Year
1
0.9
0.8
0.7
0.6
0.5
0.4
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000



Interpretation: Sustained movement of production from home to market.

This can also be understood as a consequence of the overall process of technological change.

Key Implications:

- In the absence of other changes, this implies that hours eventually trend up.
- Movement of hours between home and market is likely to be very sensitive to taxes and government programs.

Direct Evidence on Movement from Home to Market

Question: Are the differential trends in employment by gender indicative of overall movement from home to market or just a redistribution of work within the household?

Aguiar and Hurst (2005) and Ramey (2005) both show a significant drop in aggregate hours of home work for persons less than 65 in the US since 1965.

Home work decreases for women, increases for men, but aggregate still decreases.

Disaggregation by Market Sector

I ask three questions:

What market work is not being done?

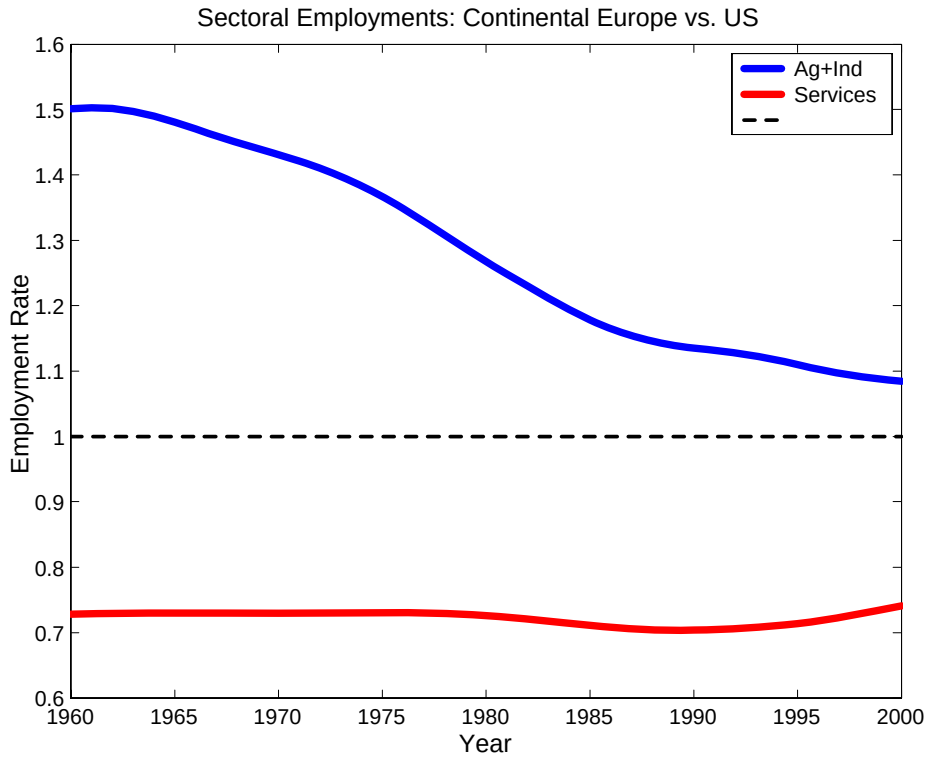
Who is not working?

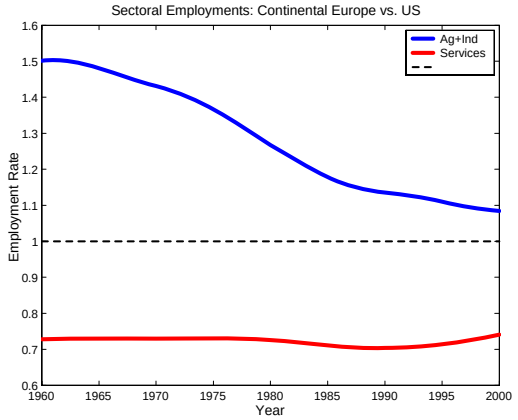
What are people doing if they are not working?

Activities

I examine employment by sectors: Agriculture, Industry and Services.

I compute the employment rate for each sector as sectoral employment/population aged 15-64.


Sectoral Employments: Continental Europe vs. US
Ag+Ind
Services
Employment Rate
Year
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
1960
1965
1970
1975
1980
1985
1990
1995
2000


Sectoral Employments: Continental Europe vs. US
Ag+Ind
Services
Employment Rate
Year
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
1960
1965
1970
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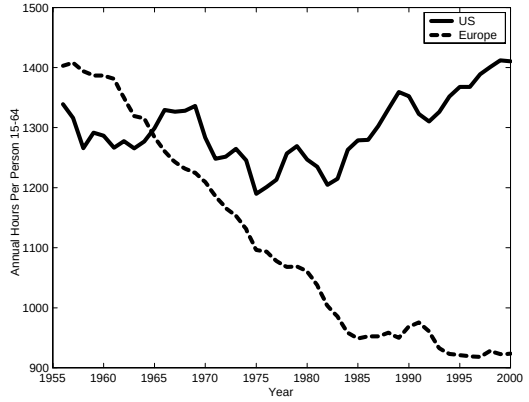
1990
1995
2000


US
Europe
Annual Hours Per Person 15-64
Year
1500
1400
1300
1200
1100
1000
900
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000

Role of Structural Transformation

- At low levels of Y/N: $Y/N\uparrow \Rightarrow Ag\downarrow\ Ind\uparrow$ and $Ser\uparrow$
- At higher levels of Y/N: $Y/N\uparrow \Rightarrow Ag\downarrow\ Ind\downarrow$ and $Ser\uparrow$

Implication: European structural transformation should lag in 1956 and have largely closed the gap by 2000.

Key question to be answered in this literature:

Why did Europe not develop a market service sector like the US?

In this paper I show that this feature of the data is consistent with the explanation that assigns a major role to tax and transfer programs.

In addition to taxes we will also show that differences in productivity are also important in understanding the differences.

Model

Objectives:

- Build a simple benchmark model of time allocation and structural transformation

Key Assumptions:

- Preferences are constant over time and across economies
- Home sector produces services that are good substitutes for market services
- Differences in productivity, over time and across countries
- Differences in tax rates, over time and across countries

Producing a Structural Transformation

Two alternatives in the literature:

- uniform technological change and non-homothetic preferences
- uneven technological change and non-Cobb-Douglas preferences

I use a hybrid:

- non-homotheticity important for movement out of agriculture
- uneven technological change dictates relative allocation to industry and services

Preferences

Representative Agent

$$U(C, 1-H) = a_C \log(C) + (1-a_C)\log(1-H)$$

$$C = [a_G(G-\bar{G})^{\varepsilon} + (1-a_G)F(S,N)^{\varepsilon}]^{1/\varepsilon}$$

$$F(S,N) = [a_S S^{\eta} + (1-a_S)N^{\eta}]^{1/\eta}$$

Technology

$$G = A_G H_G,\ S = A_S H_S,\ N = A_N H_N$$

Government

- Proportional tax on labor income at rate τ
- Revenues rebated as lump sum transfer T

Solving the Model

$$\frac{a_S}{1-a_S}\left[\frac{S}{N}\right]^{(\eta-1)} = \frac{A_N}{(1-\tau)A_S}$$

$$\frac{(1-a_G)a_S}{a_G}\frac{F(S,N)^{(\varepsilon-\eta)}S^{\eta-1}}{(G-\bar{G})^{\varepsilon-1}} = \frac{A_G}{A_S}$$

$$a_C a_G(1-\tau)A_G C^{-1}(G-\bar{G})^{\varepsilon-1} = \frac{1-a_C}{1-H}$$

Calibration Exercise

- Set 1956 productivities to one (choice of units).

- This leaves 11 parameters: three productivity parameters for 2003, three share parameters in preferences (a_C, a_G, and a_S), the subsistence parameter $\bar{G}$, two elasticity parameters (ϵ, and η) and two tax rates in 1950 and 2003.
- The levels of market productivity in goods and services in 2003, as well as tax rates in the two periods can all be measured in the data, thereby reducing the set of parameters to seven.

- Using data from the GGDC Ten Sector Database, annual average growth rates for real value added per hour were 2.48% and 1.44% in the goods and service sectors respectively for the US over the period 1950-1997. Extrapolating this growth rate over the remainder of the period yields $A_G = 3.66$ and $A_S = 2.13$ in 2003.
- Using the tax rate series from McDaniel (2006), tax rates are set to $.17$ and $.26$ in 1950 and 2003 respectively.

- If we also had a measure of home productivity in 2003 then we would be left with six parameters and six observations

US Time Allocations

	H_G	H_S	H_M	H_N
1950	.115	.135	.250	.250
2003	.058	.194	.252	.213

but measures of home sector productivity do not exist.

We instead assign a value for η, and then infer home sector productivity in 2003 through the calibration.

Estimates of η

- Using aggregate data:
  - McGrattan, Rogerson and Wright (1997) find a value of η in the range of $.40 - .45$,
  - Chang and Schorfheide (2002) find a value in the range of $.55 - .60$.
- Using micro data:
  - Rupert, Rogerson and Wright (1995) find an estimate in the range $.40 - .45$
  - Aguiar and Hurst (2008) report an estimate for their benchmark specification in the range of $.50 - .60$.
- We choose a somewhat conservative value for this elasticity and set $\eta = .45$ for the benchmark calibration.

Intuition for Calibration:

Given values for ε and $\bar{G}$, the three first order conditions for the 1950 time allocation can be used to determine the three share parameters in preferences: a_G, a_C, and a_S.

Given these three values, the three first order conditions for the time allocations in 2003 can then be used to determine the values of ε, $\bar{G}$, and A_N.

Loosely speaking, A_N determines how time devoted to services is allocated between home and market given the tax rate and productivity in market services, ε determines how time is reallocated from goods to (home and market) services given the relative changes in productivity, and $\bar{G}$ determines the increase in leisure given the increases in productivity and taxes.

Calibrated Parameter Values								
ε	η	γ_G	γ_S	γ_N	a_C	a_G	a_S	$\bar{G}$
-1.28	$.45$	2.48	1.44	-0.002	$.50$	$.07$	$.46$	$.035$

Accounting For Europe

- Set European $\tau = .29$ in 1956, $.47$ in 2003.
- Productivities equal to US levels in 2003
- Output per hour in Europe is .50 of US in 1956, a lag of 33 years.

European Time Allocation 2003				
	H_G	H_S	H_M	H_N
Model	.049	.128	.177	.259
Data	.055	.124	.179	–

European Time Allocation 1956				
	H_G	H_S	H_M	H_N
Model	.160	.100	.260	.246
Data	.176	.099	.276	–

Changes in European Time Allocation 1956-2003				
	$\Delta \log H_G$	$\Delta \log H_S$	$\Delta \log H_M$	$\Delta \log H_N$
Data	-1.16	$.23$	$-.43$	–
A and τ	-1.18	$.25$	$-.38$	$.05$
A only	-1.03	$.62$	$-.07$	$-.11$
τ only	$-.08$	$-.43$	$-.20$	$.10$

Changes in European Hours 1956-2003: The Role of η				
	$\Delta \log H_G$	$\Delta \log H_S$	$\Delta \log H_M$	$\Delta \log H_N$
Data	-1.16	$.23$	$-.43$	–
$\eta = .45$	-1.18	$.25$	$-.38$	$.05$
$\eta = .35$	-1.19	$.26$	$-.36$	$.01$
$\eta = .55$	-1.20	$.21$	$-.44$	$.08$

Conclusions

- In 1956, technology factors are dominant
- In 2000, tax factors are dominant
- From 1956-2000, h drops by roughly 40% in Europe relative to the US. The split is 17% due to technology and 23% due to taxes
- Differences in leisure accounts for about 1/4 of difference in 2000