Tax Progressivity in Australia:

Facts, Measurements and Estimates

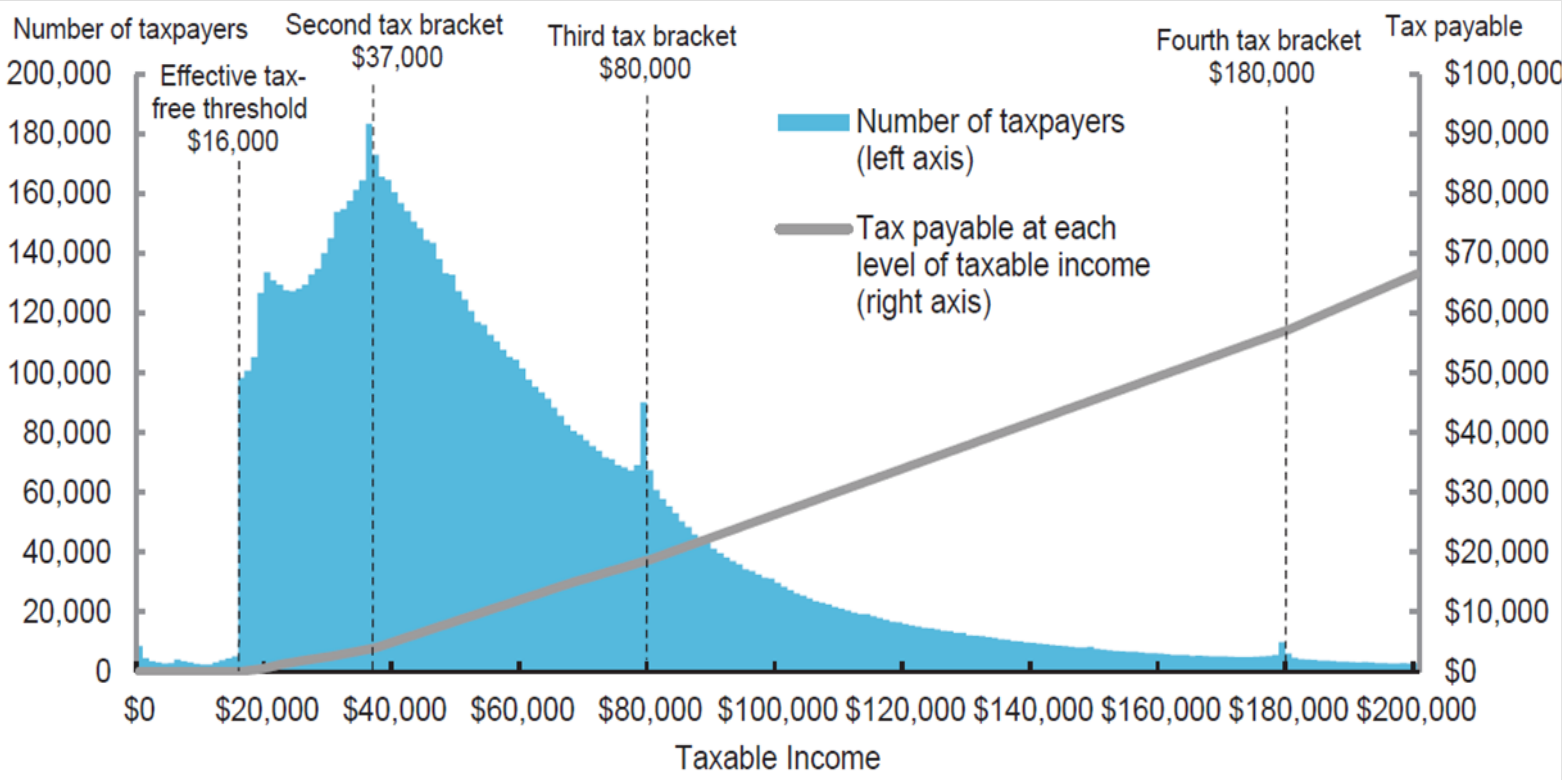
Chung Tran
Australian National University

ANU, January 2017

How Progressive Should Income Taxation Be?

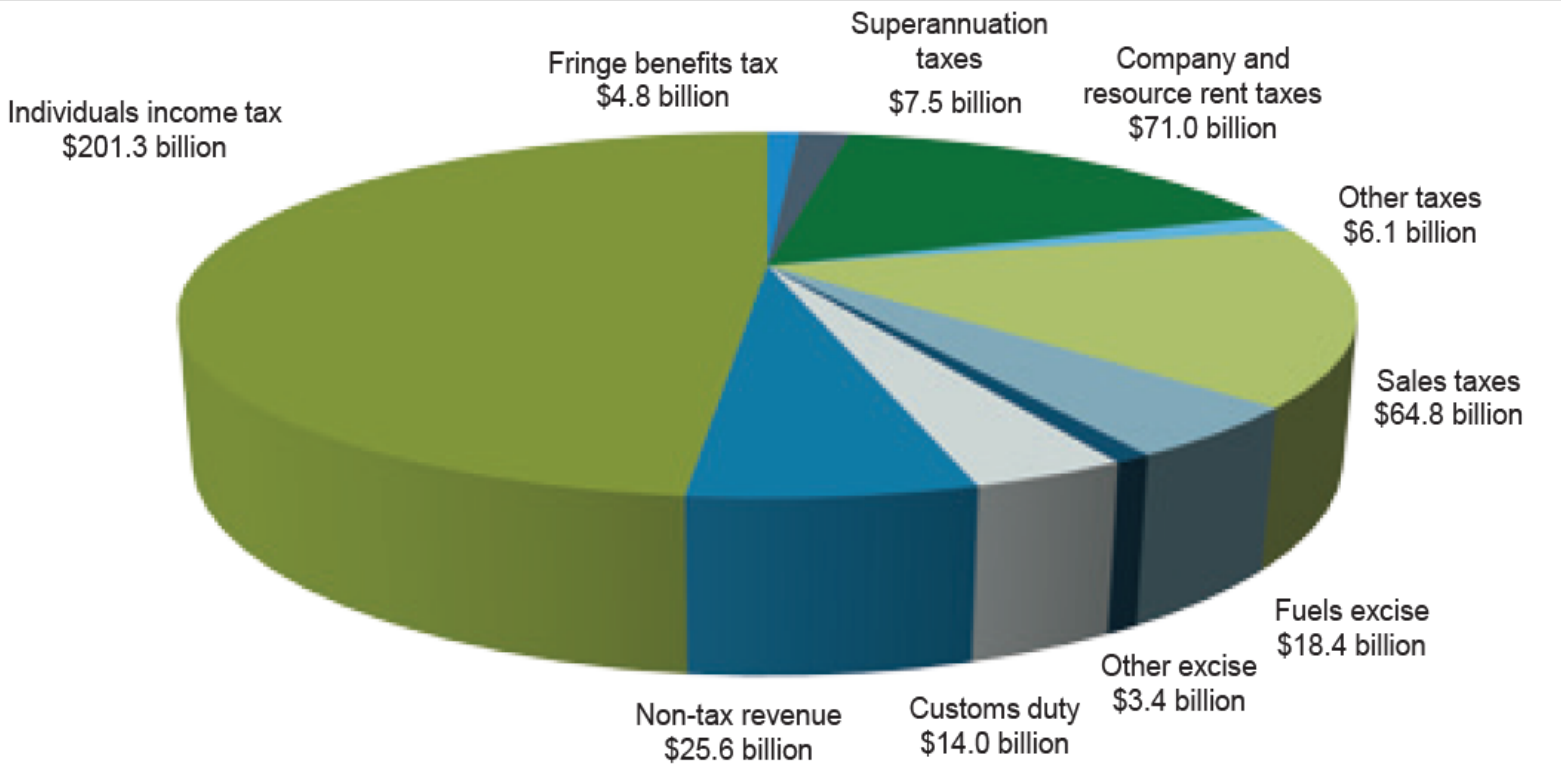
- In favor: missing markets
  - Social insurance
  - Redistribution
- Against: distortions
  - Labor supply
  - Savings and investment
  - Human capital accumulation
- How do these trade-offs play out?
  - in Australia's income tax system

Australia's Income Tax System in 2014 [1]



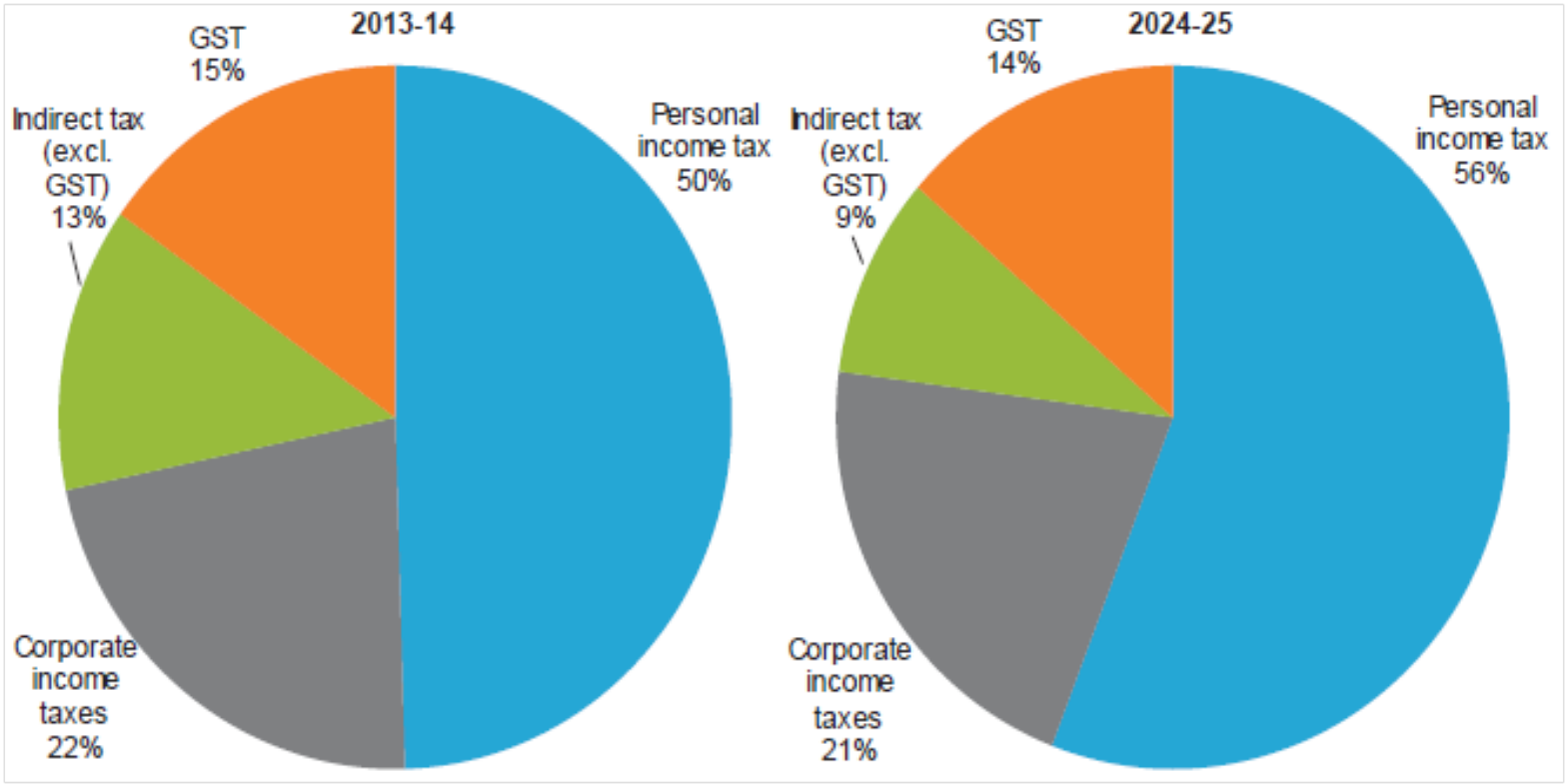
[1] Source: Treasury(2016)

Tax Revenue by Sources in 2014[2]



[2]Source: Treasury(2016)

Income Taxes in Future[3]



[3]Source: Treasury(2016)

This Project

1. Aims to address two questions
   - How progressive the individuals income tax system is?
   - Should it be more or less progressive?
2. Consists of two papers:
   - Empirical one: Facts, measurements and estimates
   - Analytical one: General equilibrium analysis

This Paper: Empirical Investigation

1. Documents the distribution of income and taxes in Australia
2. Quantifies the progressivity of Australia's individuals income tax system
3. Estimates the parametric form of the progressive income tax function

Preliminary Results

- The individuals income tax system is highly progressive.
  - Suits index is 0.66 in 2014
- It has become more progressive, compared to 2004.
  - Tax cuts for the rich and the poor
  - But, tax hikes for the middle income class

Data

1. Australian Tax Office (ATO)
   - Series of sample files of individual tax return data
   - Time frame: 2004-2014
   - Sample size
     - Period 2004-11: 1% of records
     - Period 2012-14: 2% of records
2. The Household, Income and Labour Dynamics in Australia Survey (HILDA)
   - Household survey data
   - Time frame: 2004-2014

ATO Data: Key Information

- Demographics: Gender, age, occupation, partner status, region
- Total income: Labor incomes, capital incomes, public pension and allowance, and private transfers
- Deductions
- Taxable income
- Others: Superannuation, help debt, private health insurance

ATO Data Description

Table: Summary Statistics in 2014

Variable	Mean	Std. Dev.	Min.	Max.
gender	0.478	0.5	0	1
age_range	5.811	3.055	0	11
occ_code	3.574	2.896	0	9
partner_status	0.556	0.497	0	1
region	275.128	166.381	101	902
tot_inc_amt	60125.216	101480.551	-314867	6531263
tot_ded_amt	2594.145	7624.463	0	554096
taxable_income	57473.563	98924.195	0	6374590
phi_ind	0.566	0.496	0	1
help_debt	1942.324	7528.66	0	136481
mcs_ttl_acnt_bal	111072.148	295631.362	0	13956577
N		258774		

Data Description: Income by Gender

Table: **Total Income by Gender**

Gender	mean	p50	sd
Male	71,245	53,152	113,095
Female	48,004	37,464	85,441
All	60,125	44,404	101,481

Data Description: Income by Occupation Code

Table: **Total Income by Occupation**

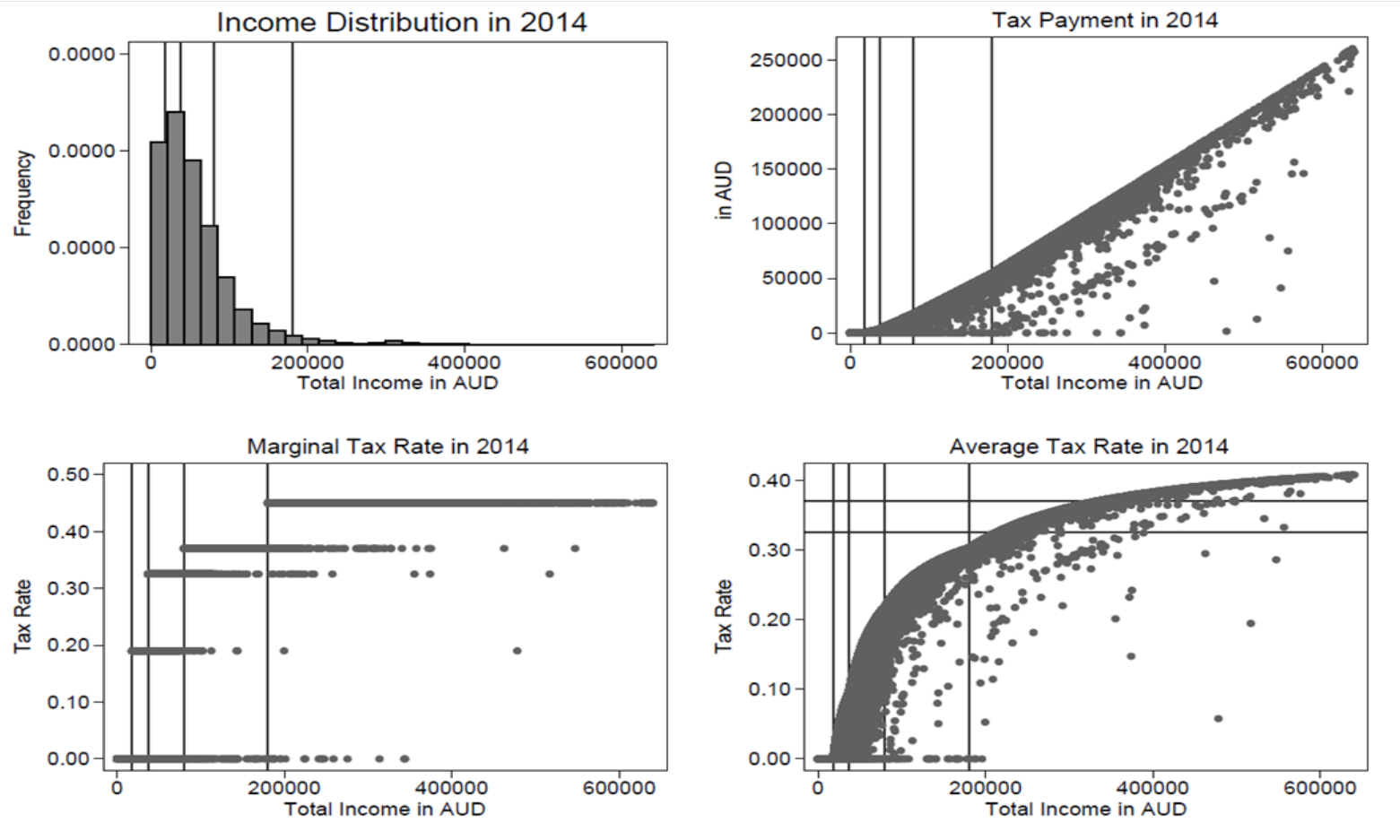
Occupation code	mean	p50	sd
0: Not listed or specified	43,827	22,101	134,680
1: Managers	101,042	71,041	174,270
2: Professionals	83,669	69,263	98,474
3: Technicians and trades workers	66,544	56,605	52,877
4: Community and personal service workers	40,281	34,608	29,377
5: Clerical and administrative workers	54,581	46,564	68,008
6: Sales workers	39,505	31,417	51,684
7: Machinery operators and drivers	65,571	57,412	41,044
8: Labourers	41,870	34,876	34,869
9: Consultants, apprentices not specified	50,208	37,620	95,630
All	60,125	44,404	101,481

Data Description: Income by Age Group

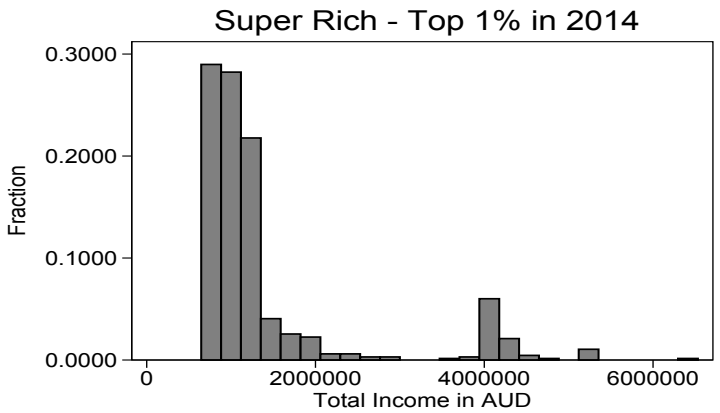
Table: **Total Income by Age**

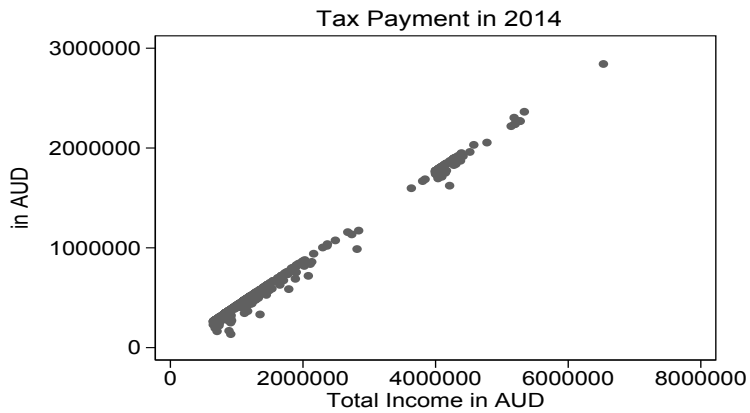
Age Group	mean	p50	sd
0: 70 and over	47,284	25,415	175,767
1: 65-69	50,397	29,753	151,595
2: 60-64	59,288	41,155	108,727
3: 55-59	71,788	52,022	126,478
4: 50-54	74,980	54,527	123,634
5: 45-49	76,197	55,397	127,722
6: 40-44	73,264	54,776	101,921
7: 35-39	67,774	55,065	71,625
8: 30-34	60,114	52,703	46,831
9: 25-29	49,666	45,148	35,201
10: 20-24	34,926	30,657	26,367
11: Under 20	18,135	14,336	19,147
Total	60,125	44,404	101,481

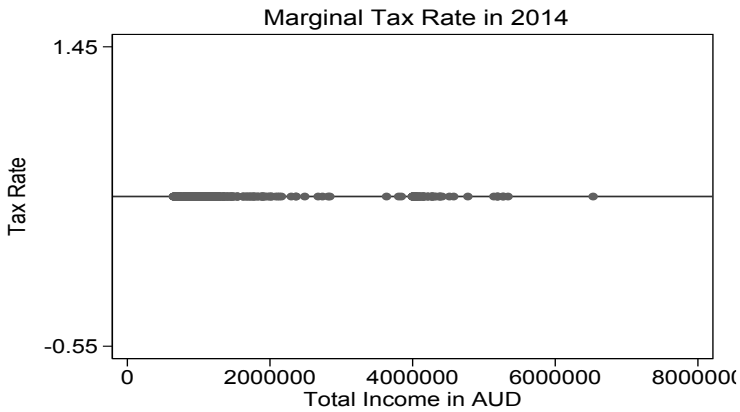
Distribution of Income and Taxes in 2014

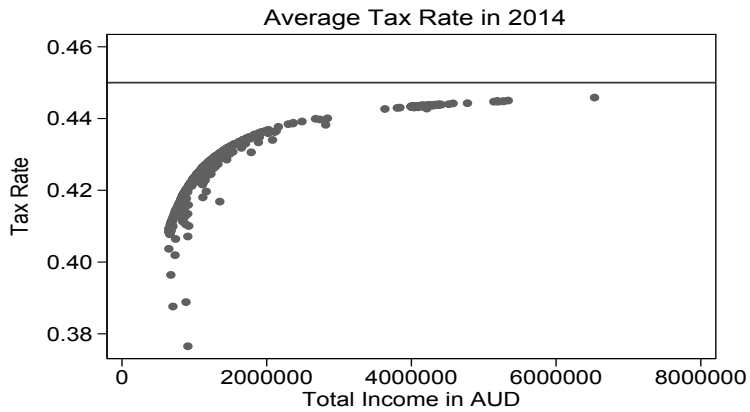


Income and Taxes Paid by Top 1% in 2014

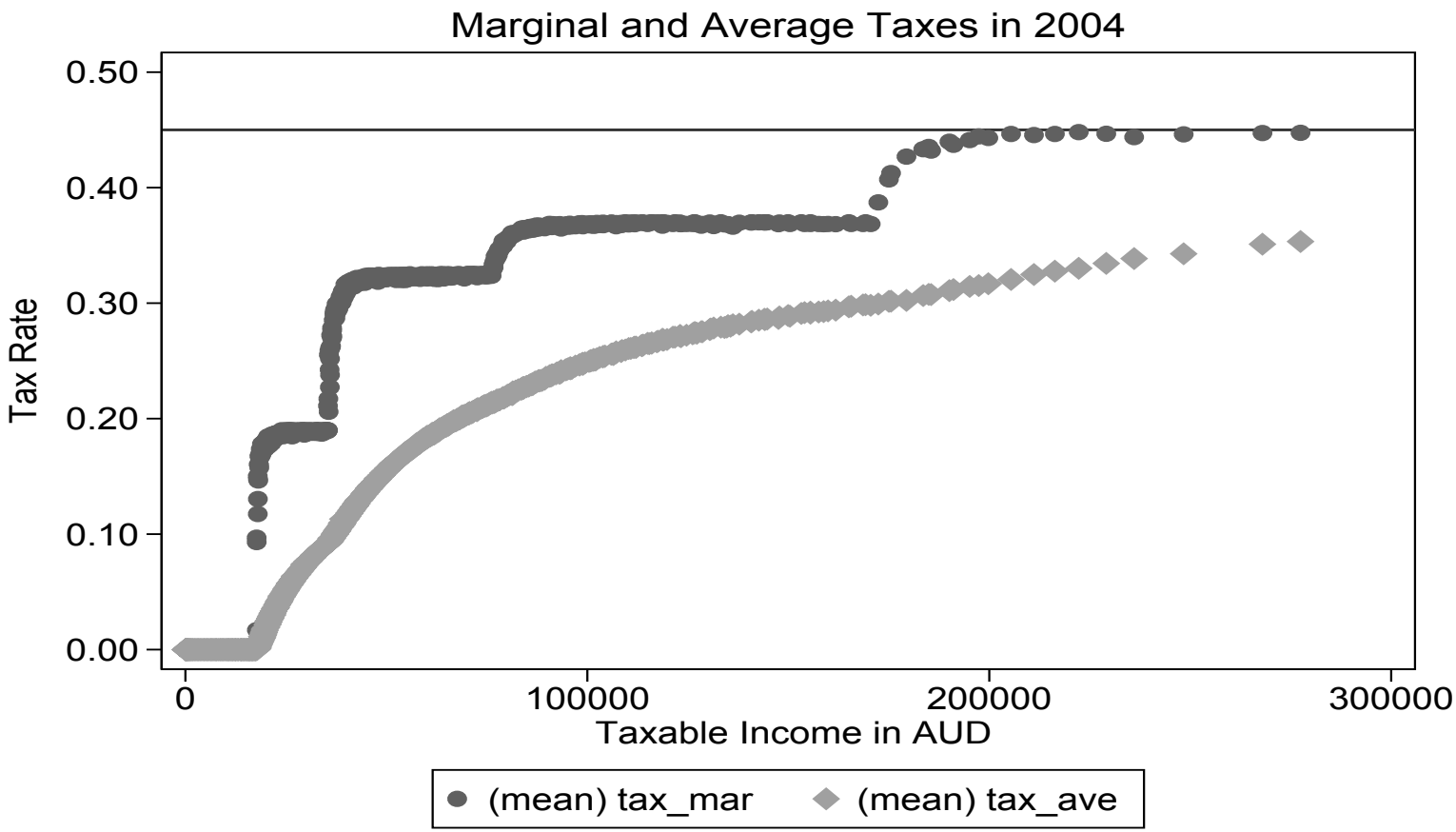




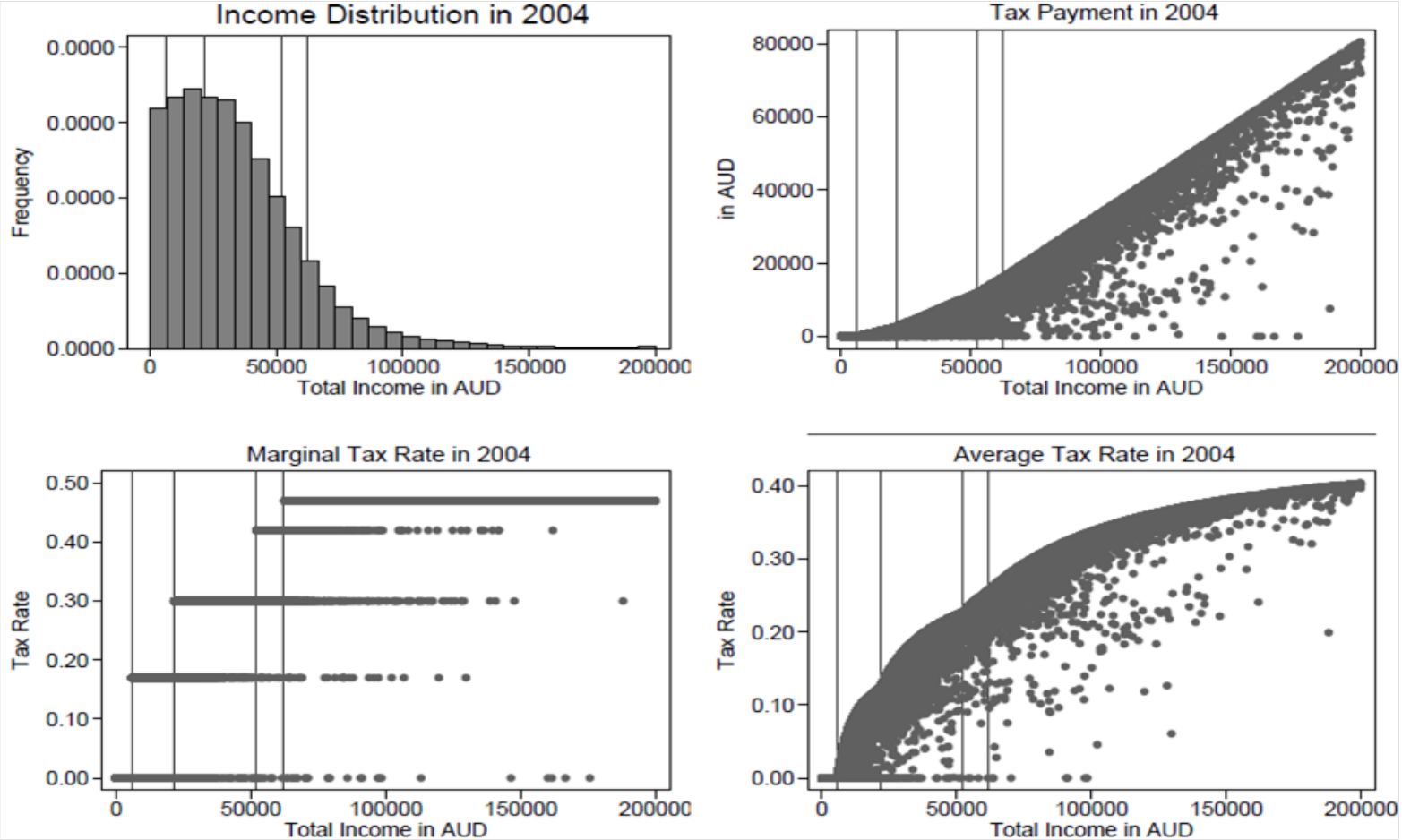




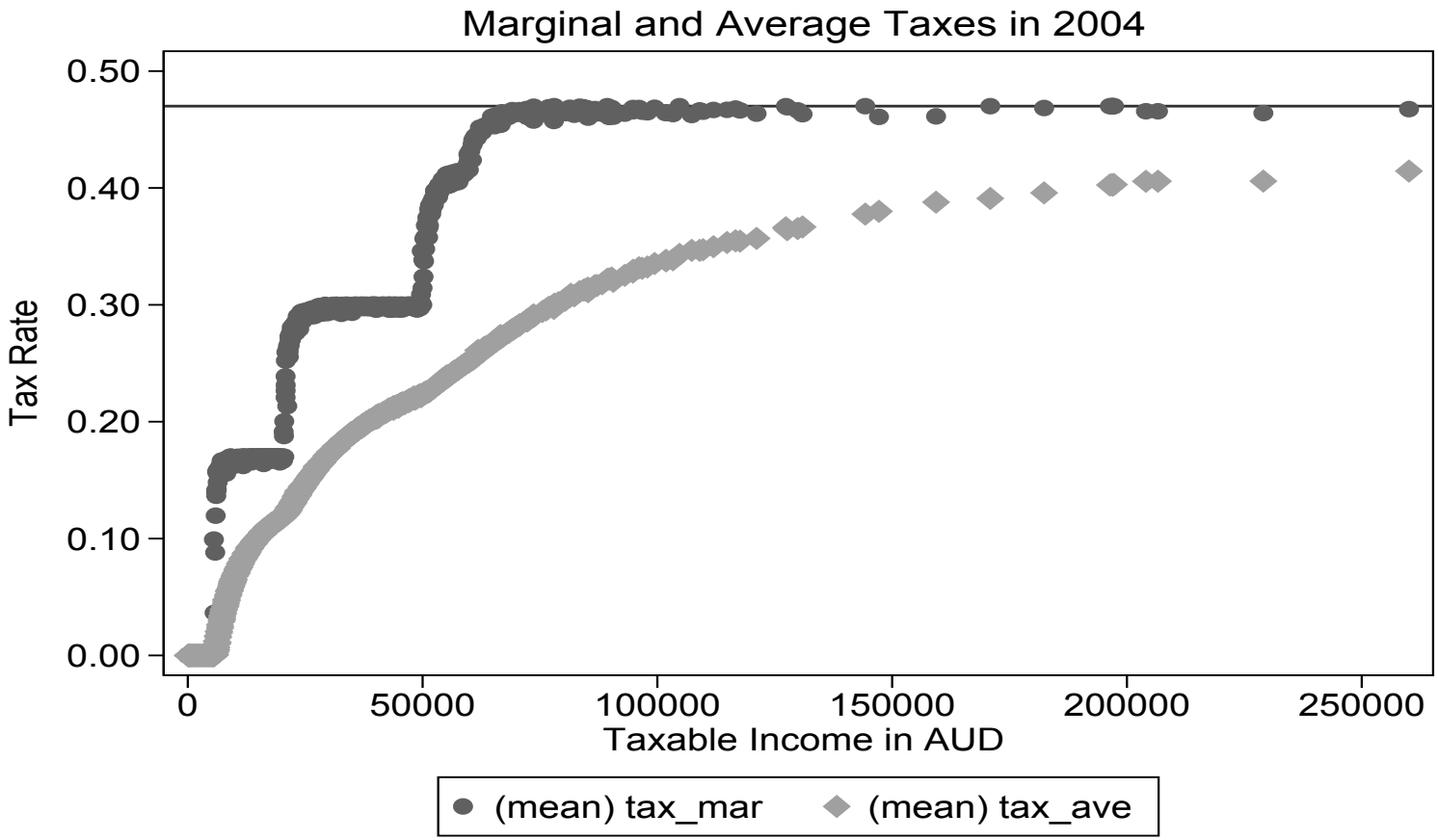
Marginal vs. Average Taxes in 2014



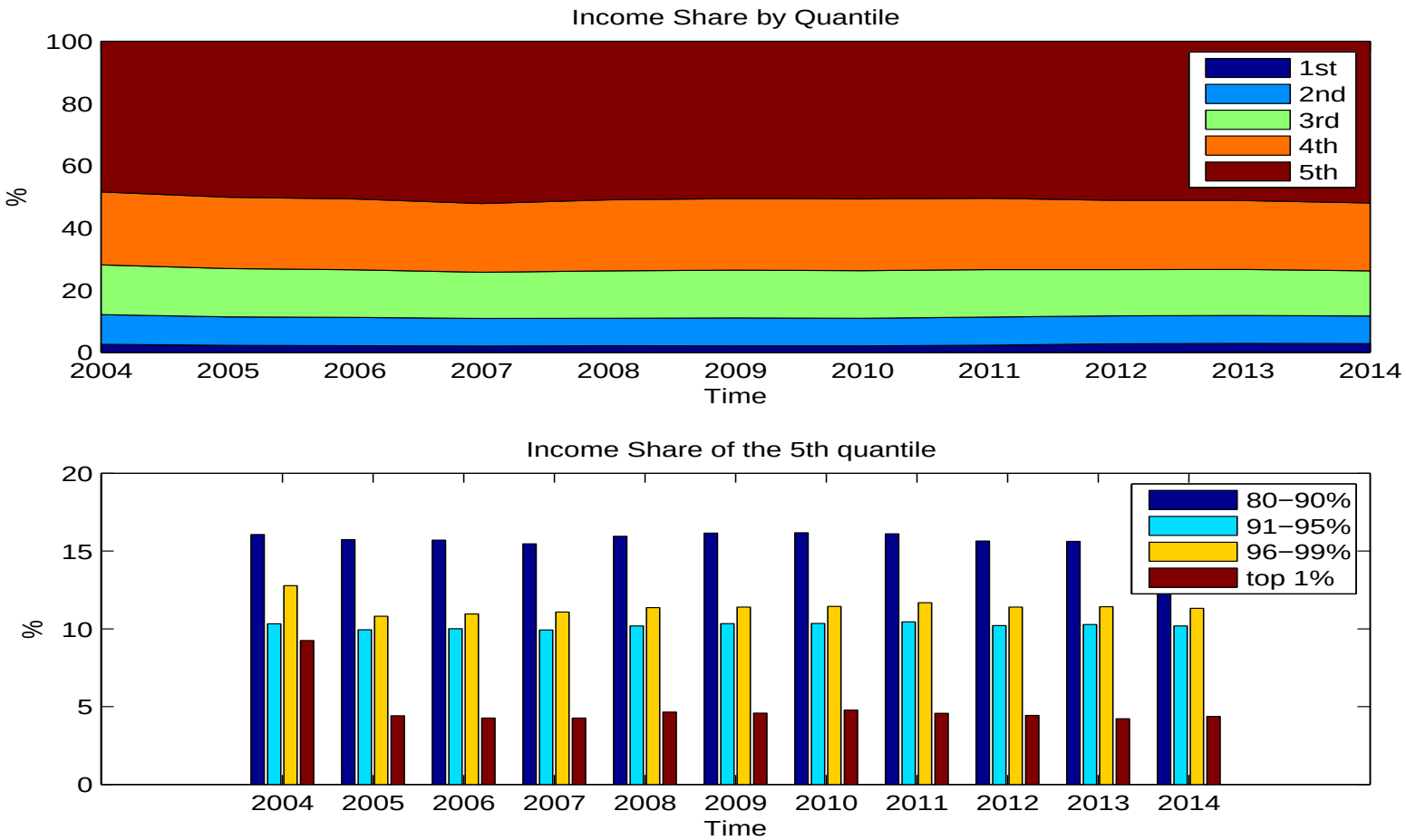
Distribution of Income and Taxes in 2004



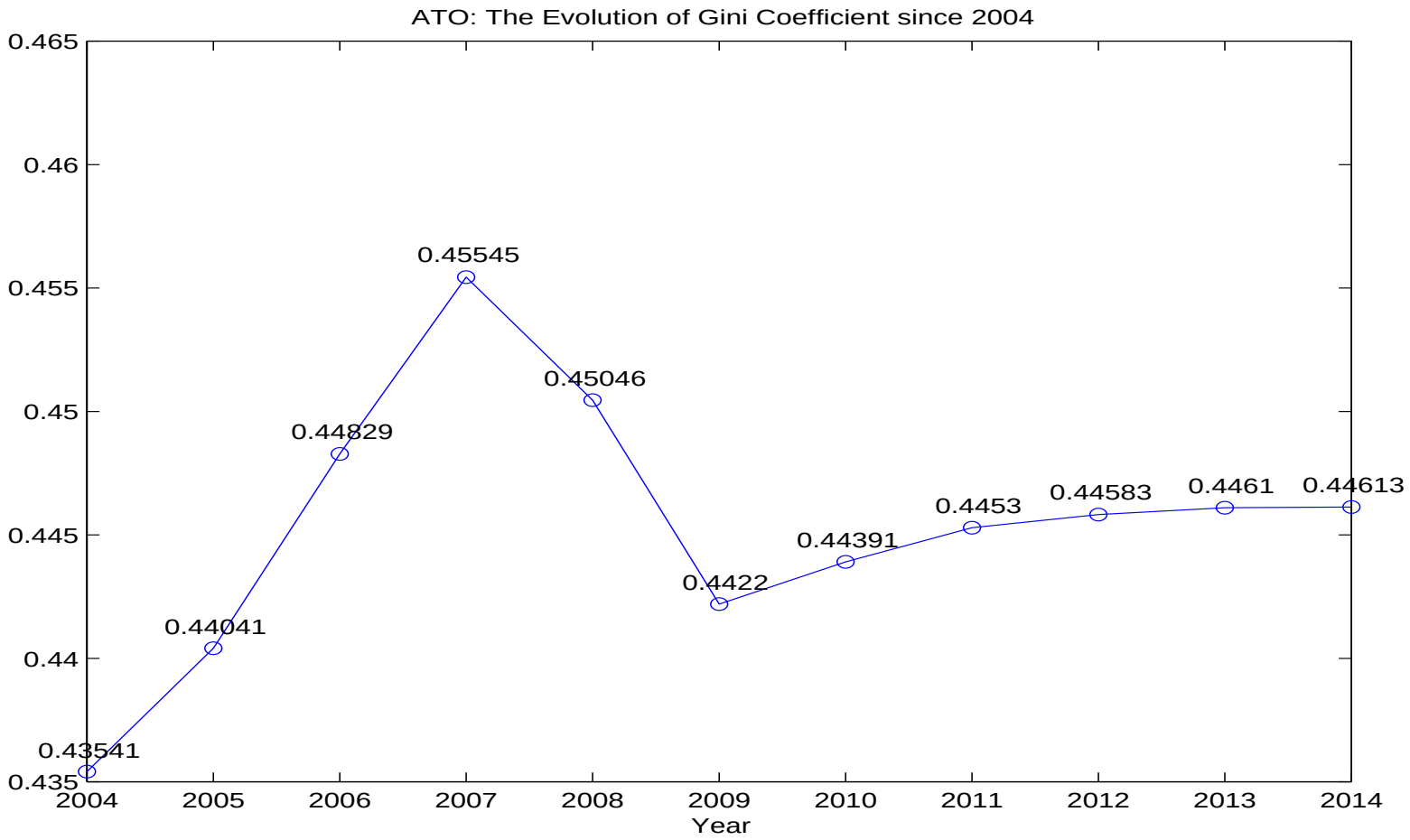
Marginal vs. Average Taxes in 2004



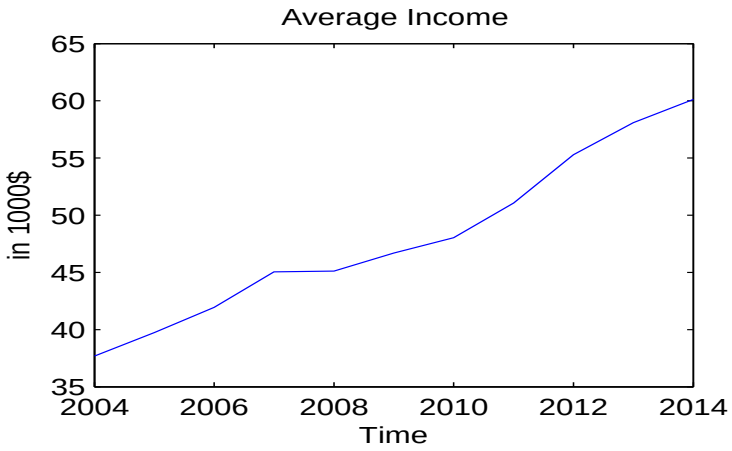
Dynamics of Income Distribution between 2004 and 2014

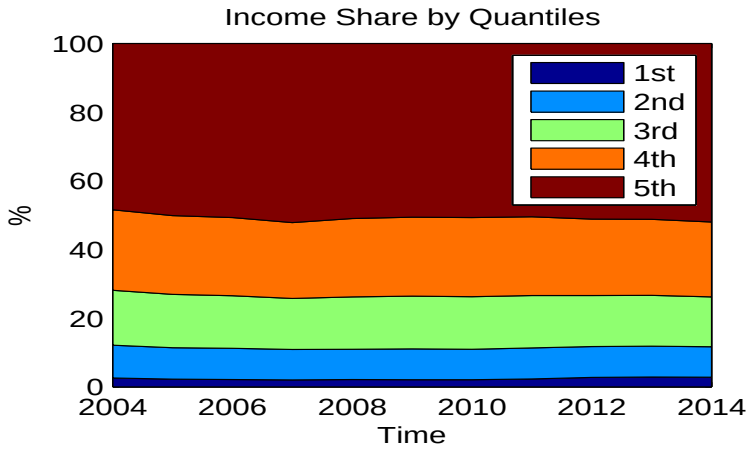


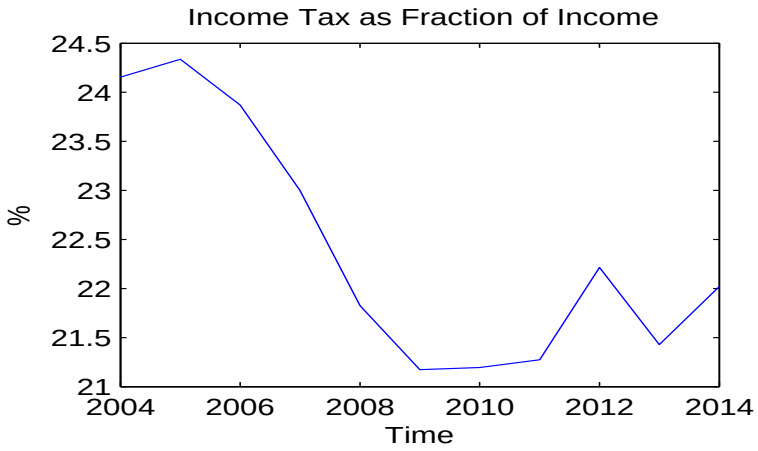
Income Inequality

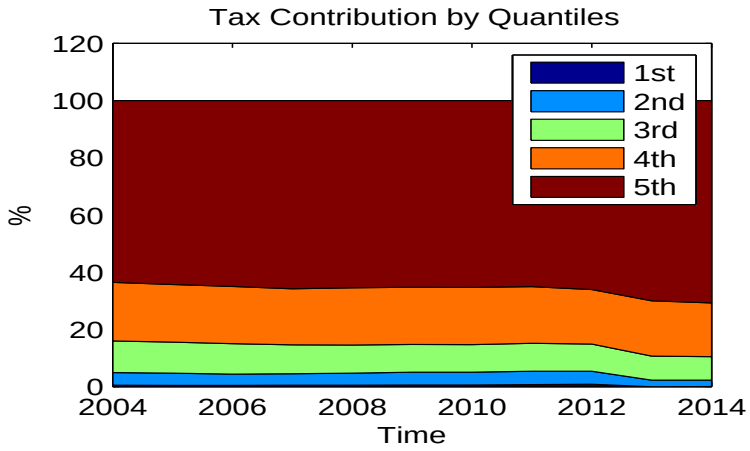


Income Growth and Tax Contribution

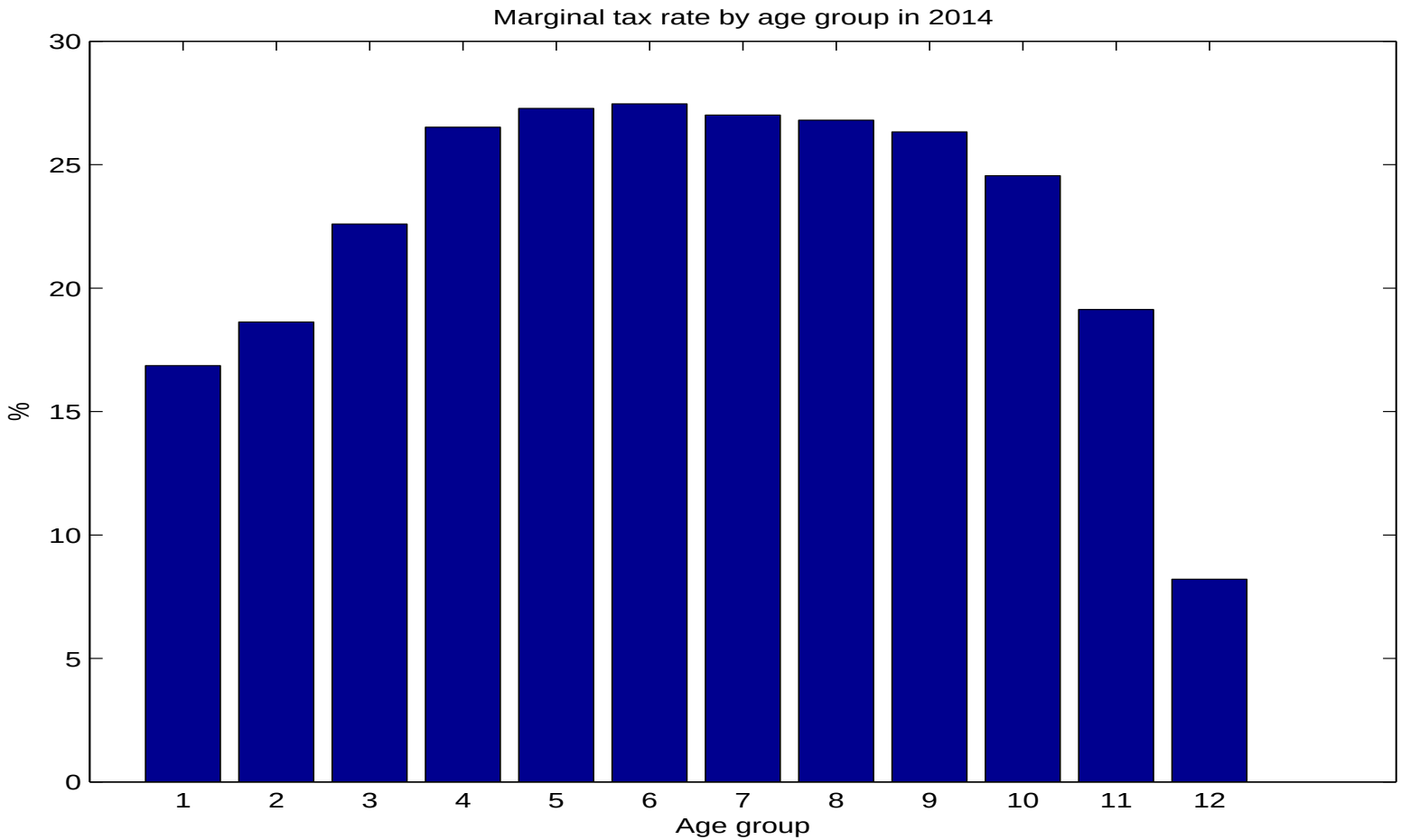




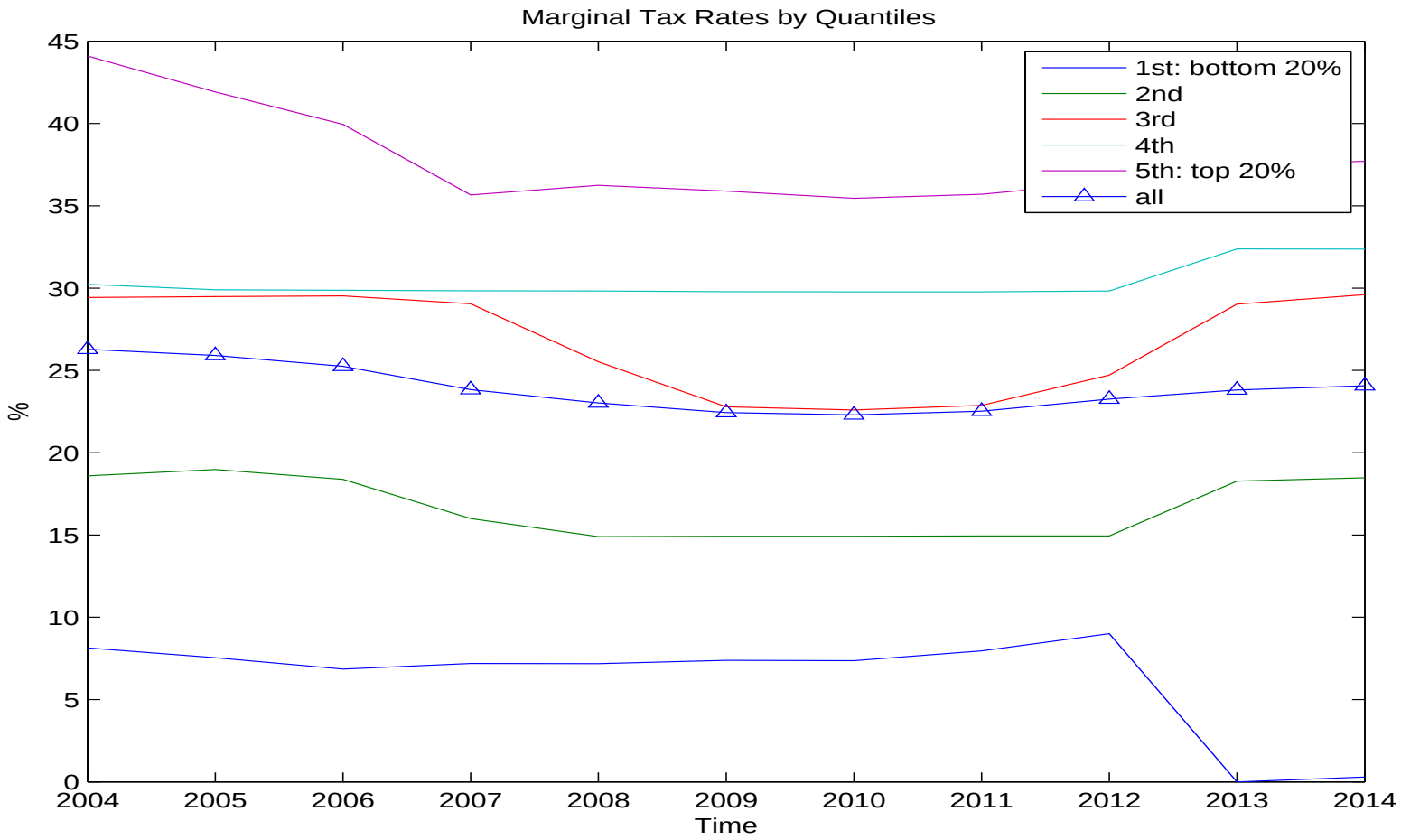




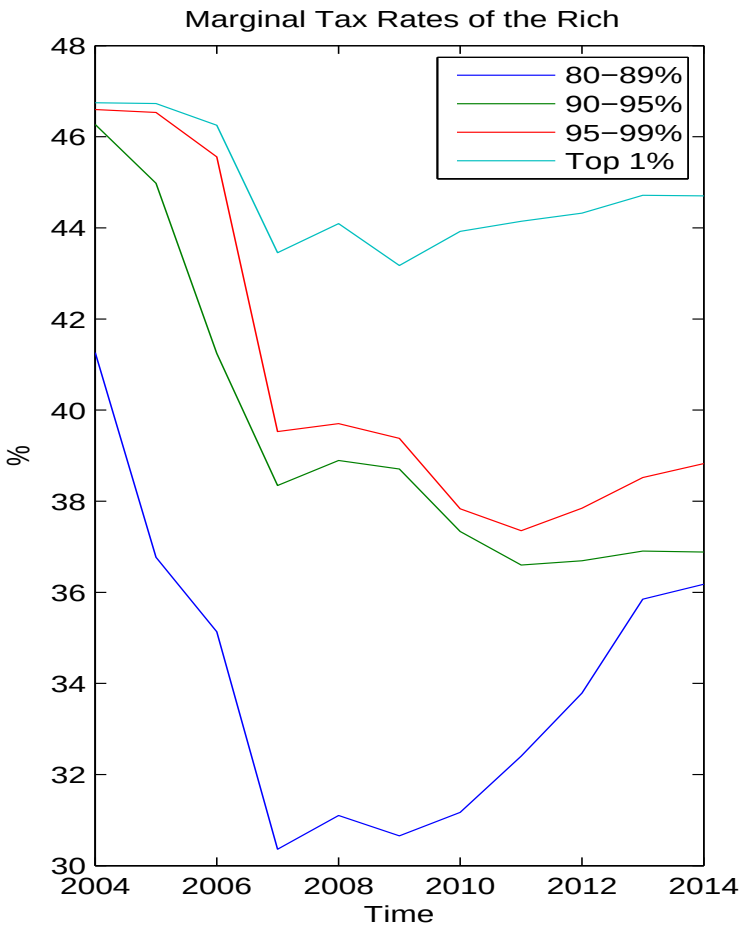
Marginal Tax Rates by Age Group in 2014

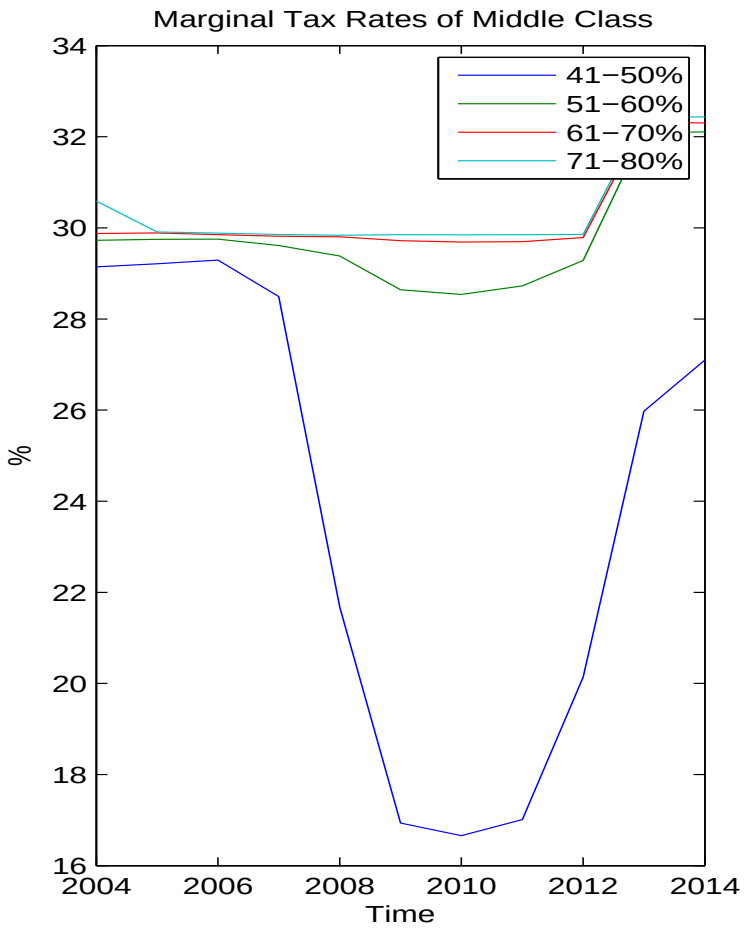


Marginal Tax Rates over Time

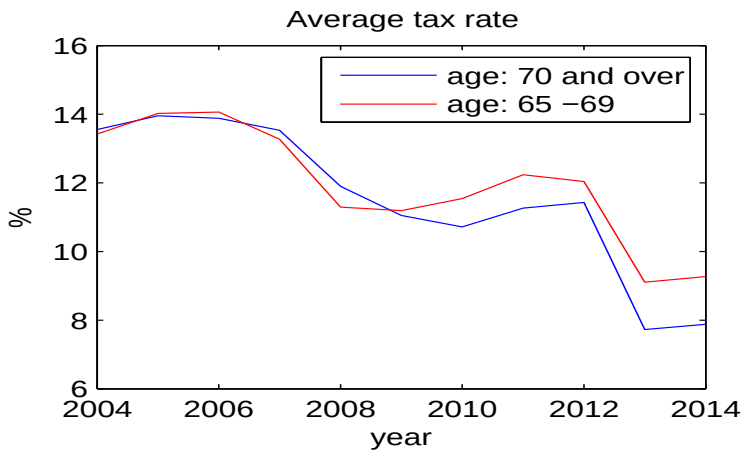


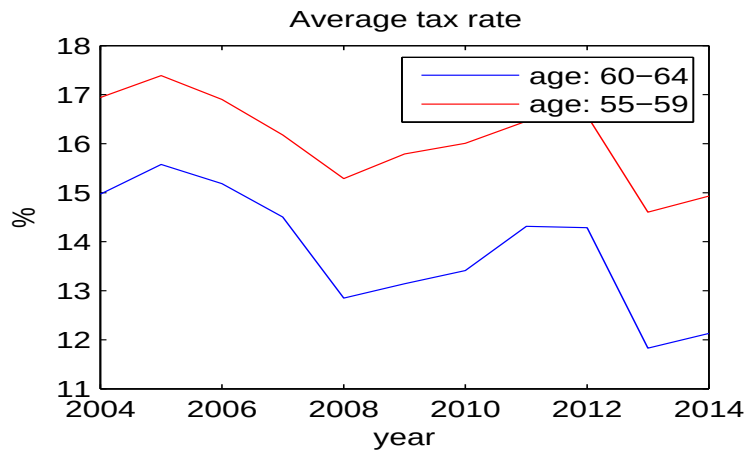
Marginal Tax Rates over Time

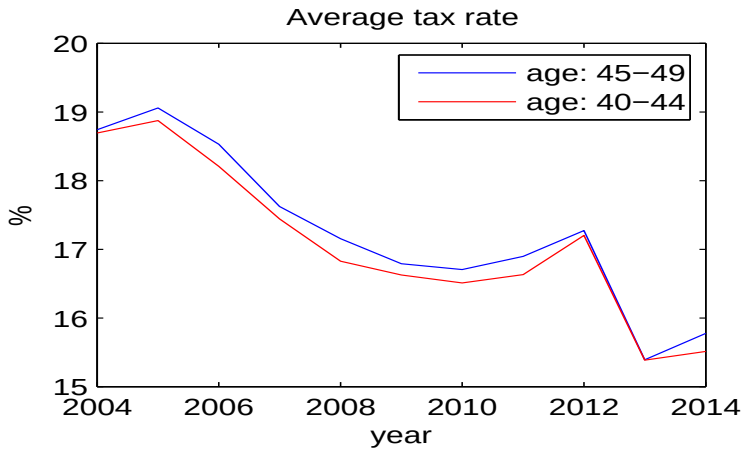


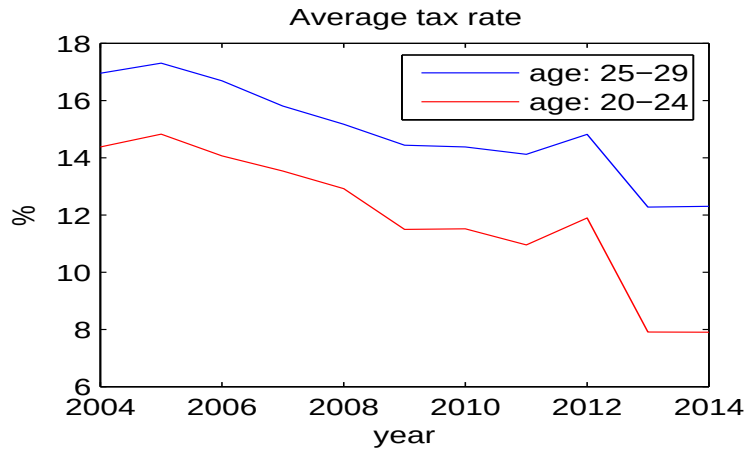


Average Tax Rates by Age Group over Time

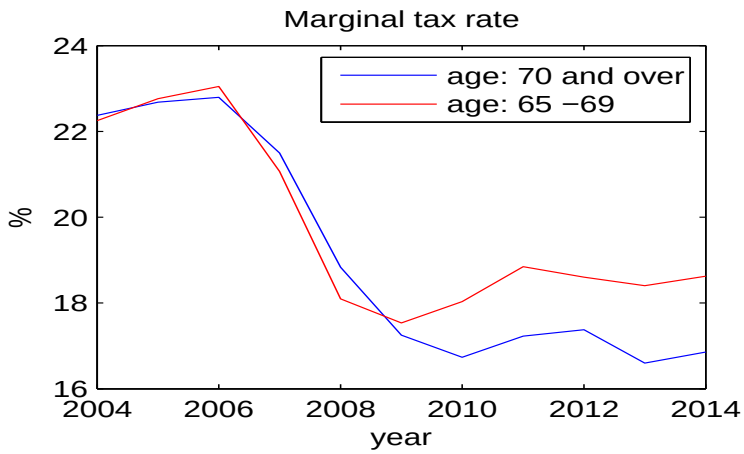


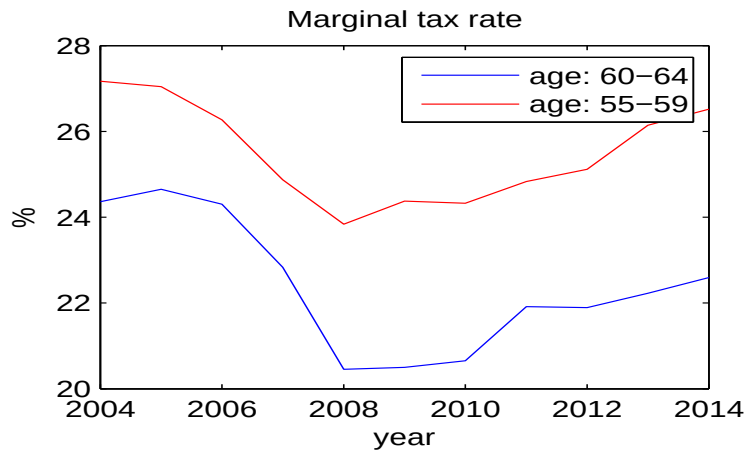


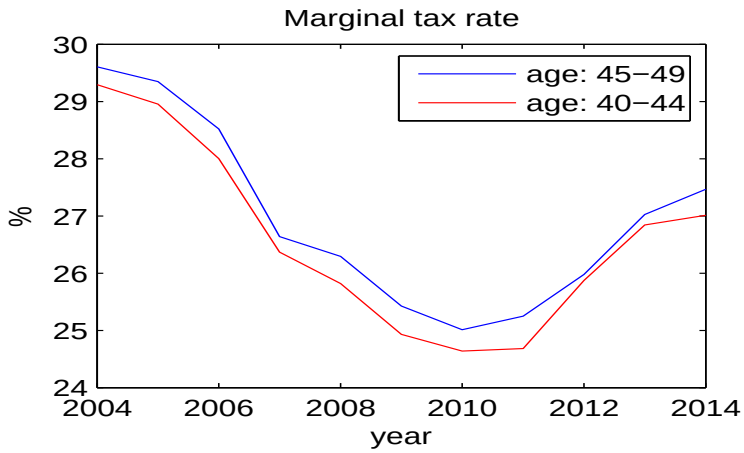


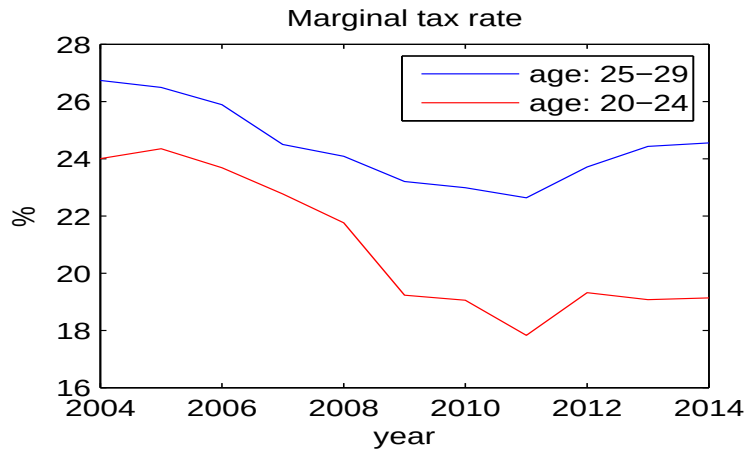


Marginal Tax Rate by Age Group over Time

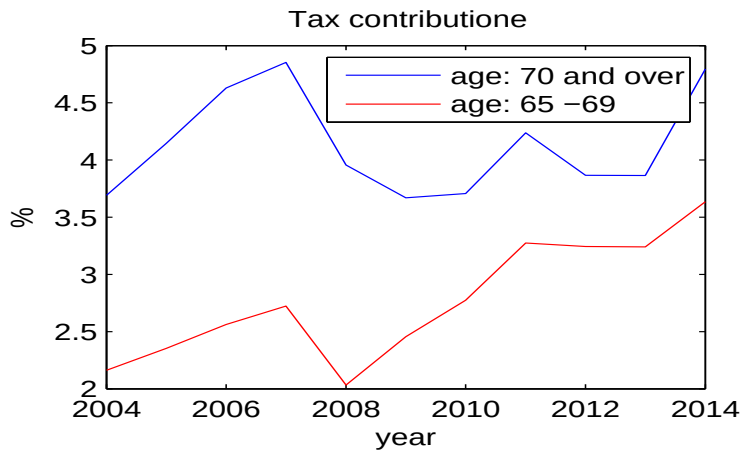


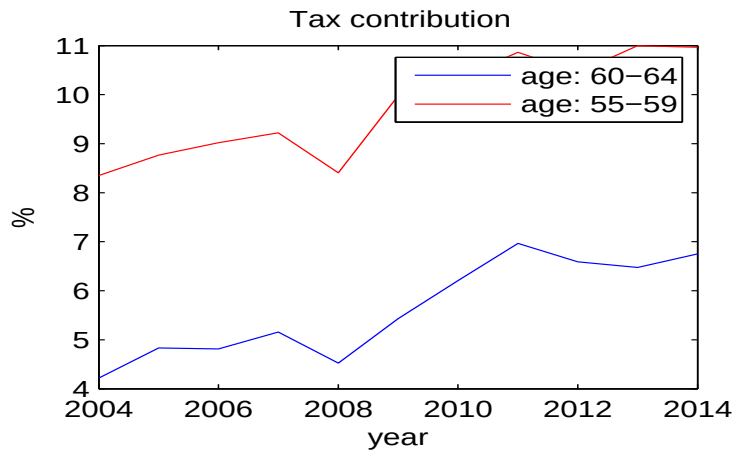


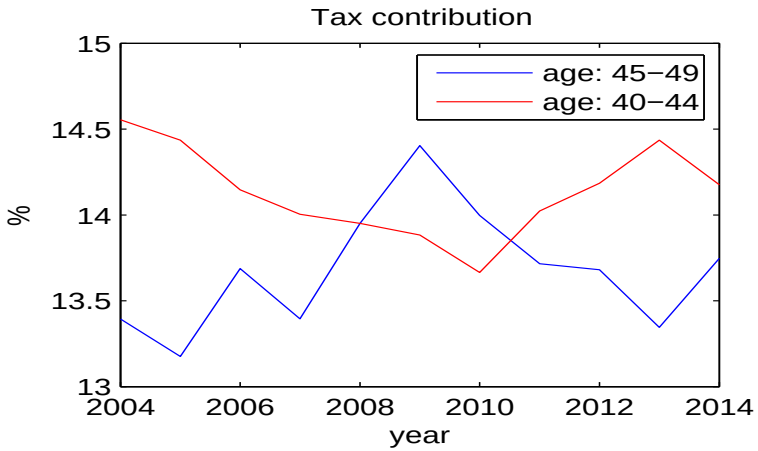


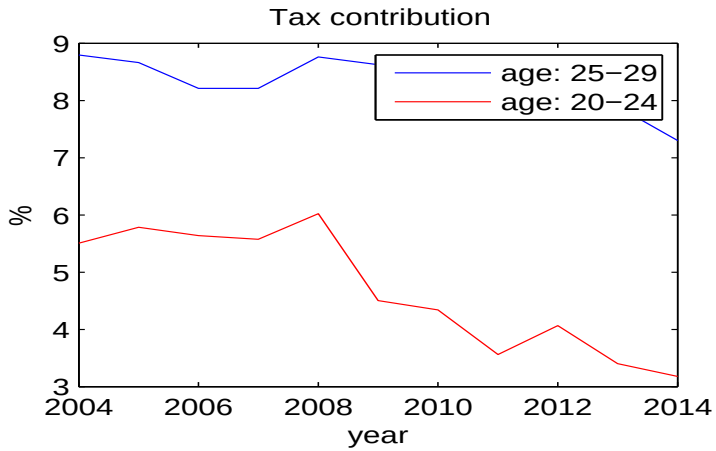


Tax Contribution by Age

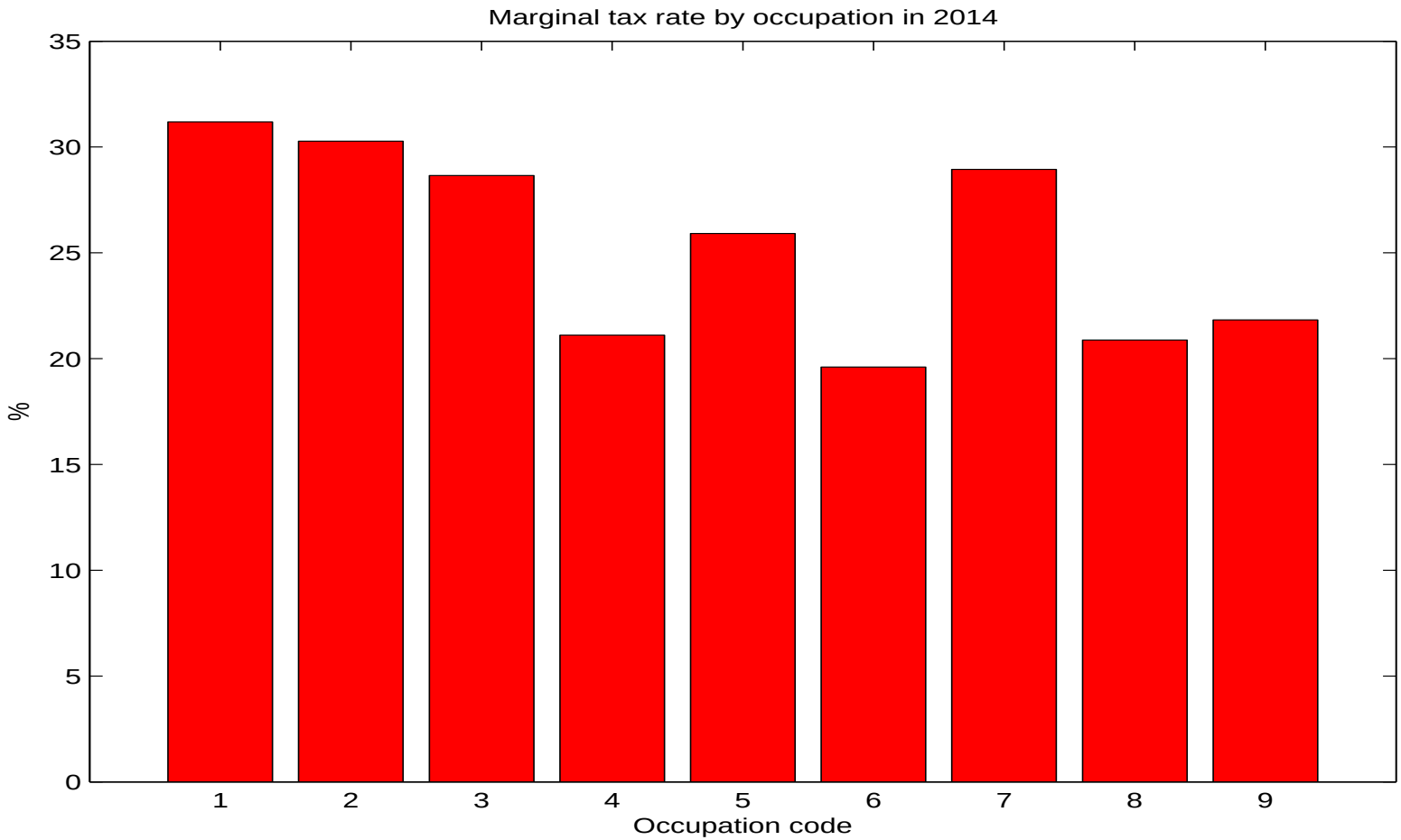




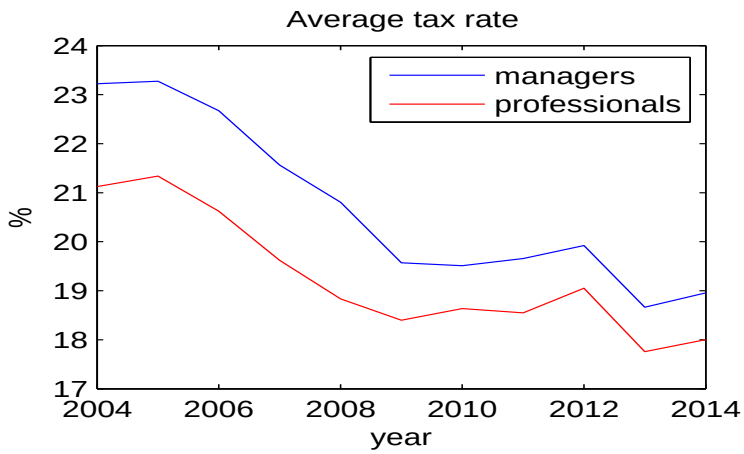


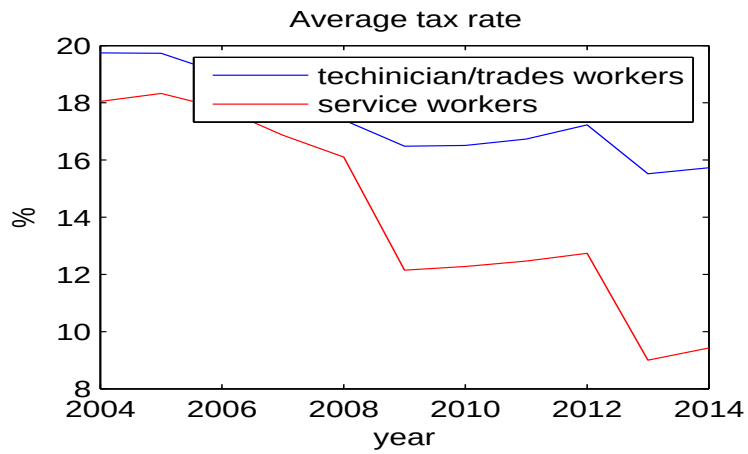


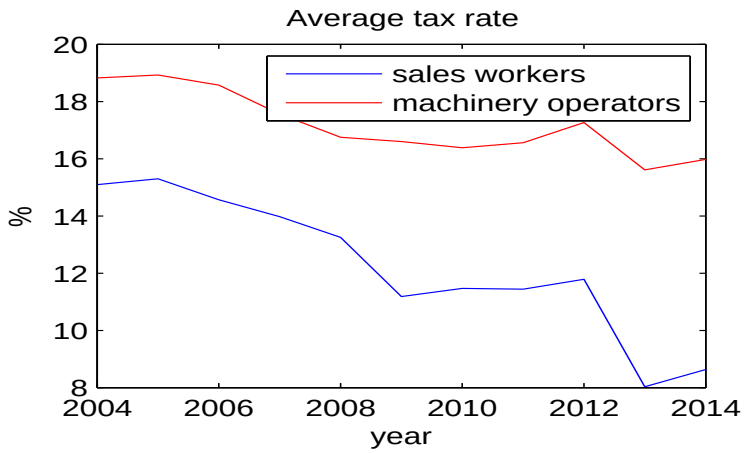
Marginal Tax Rates by Occupation in 2014

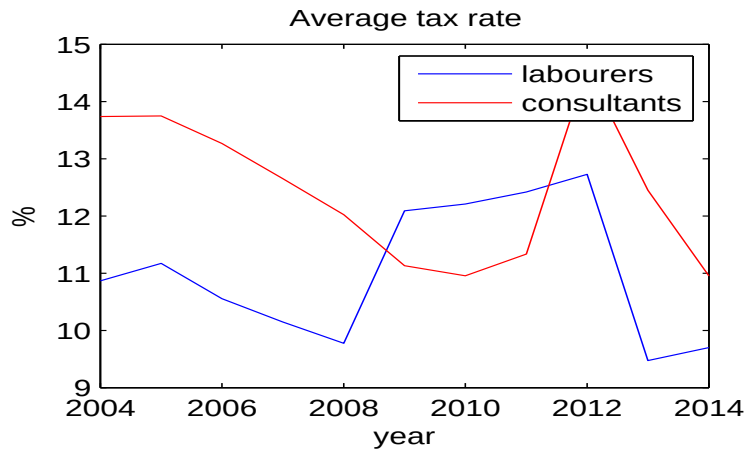


Average Tax Rate by Occupation over Time

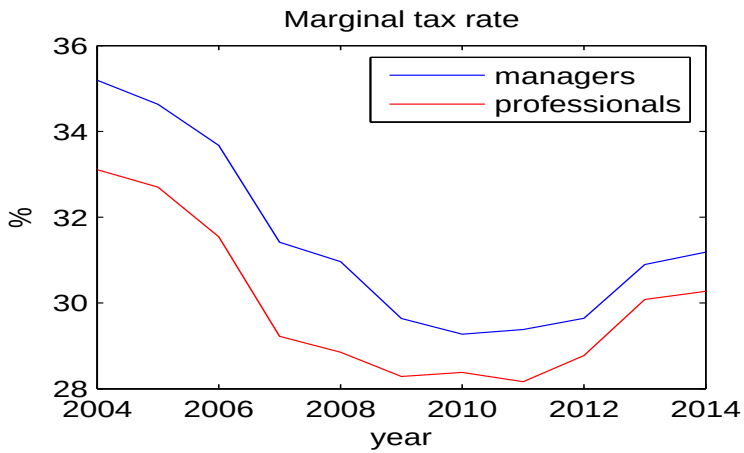


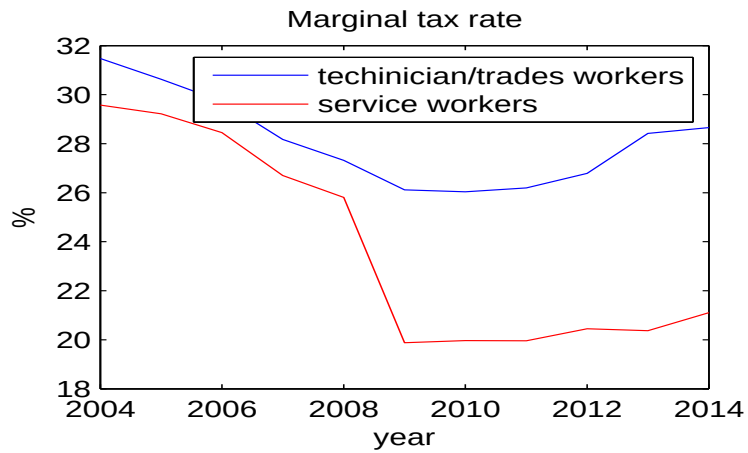


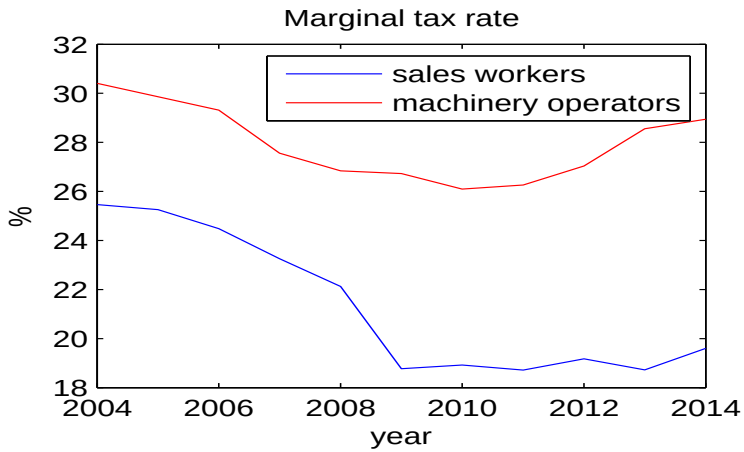


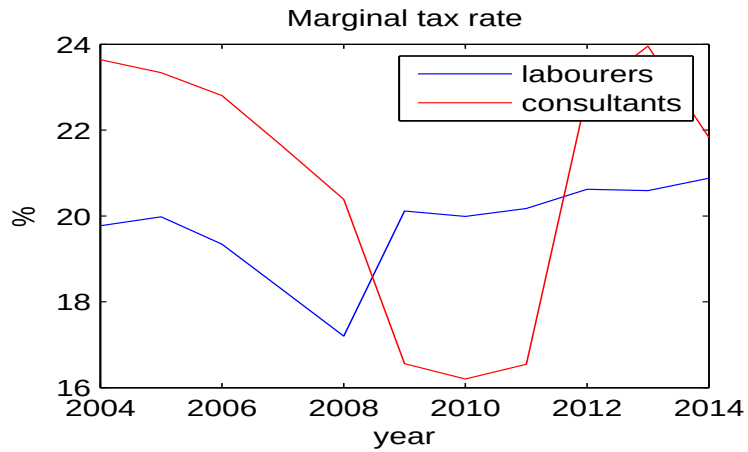


Marginal Tax Rate by Occupation over Time

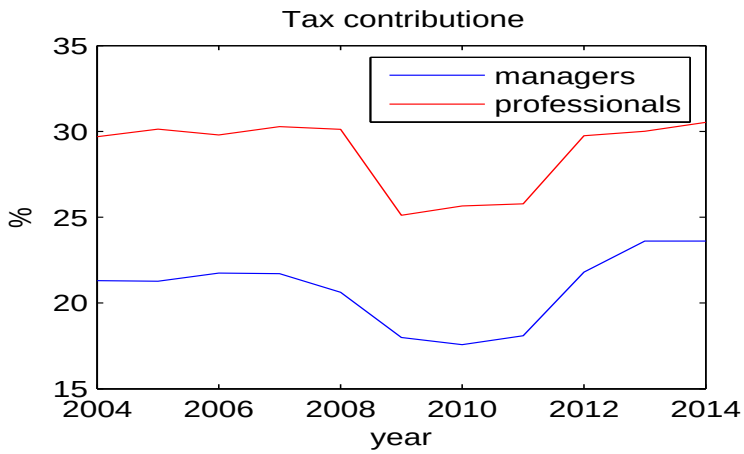


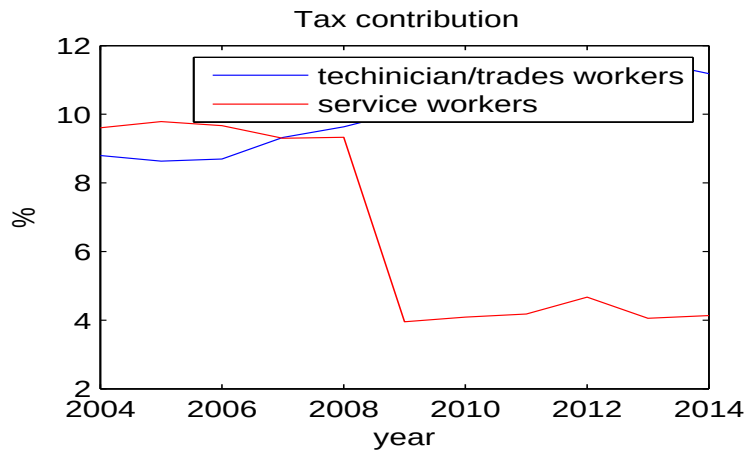


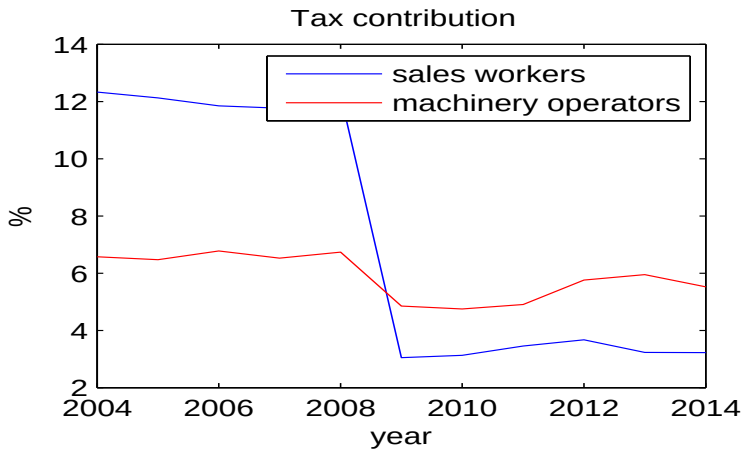


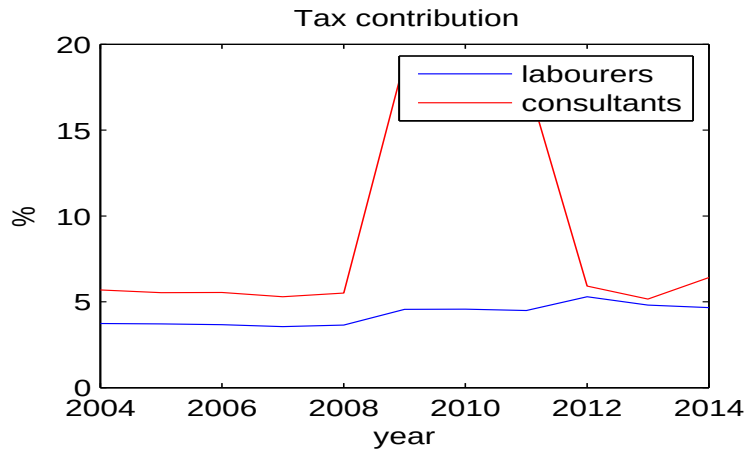


Tax Contribution by Occupation





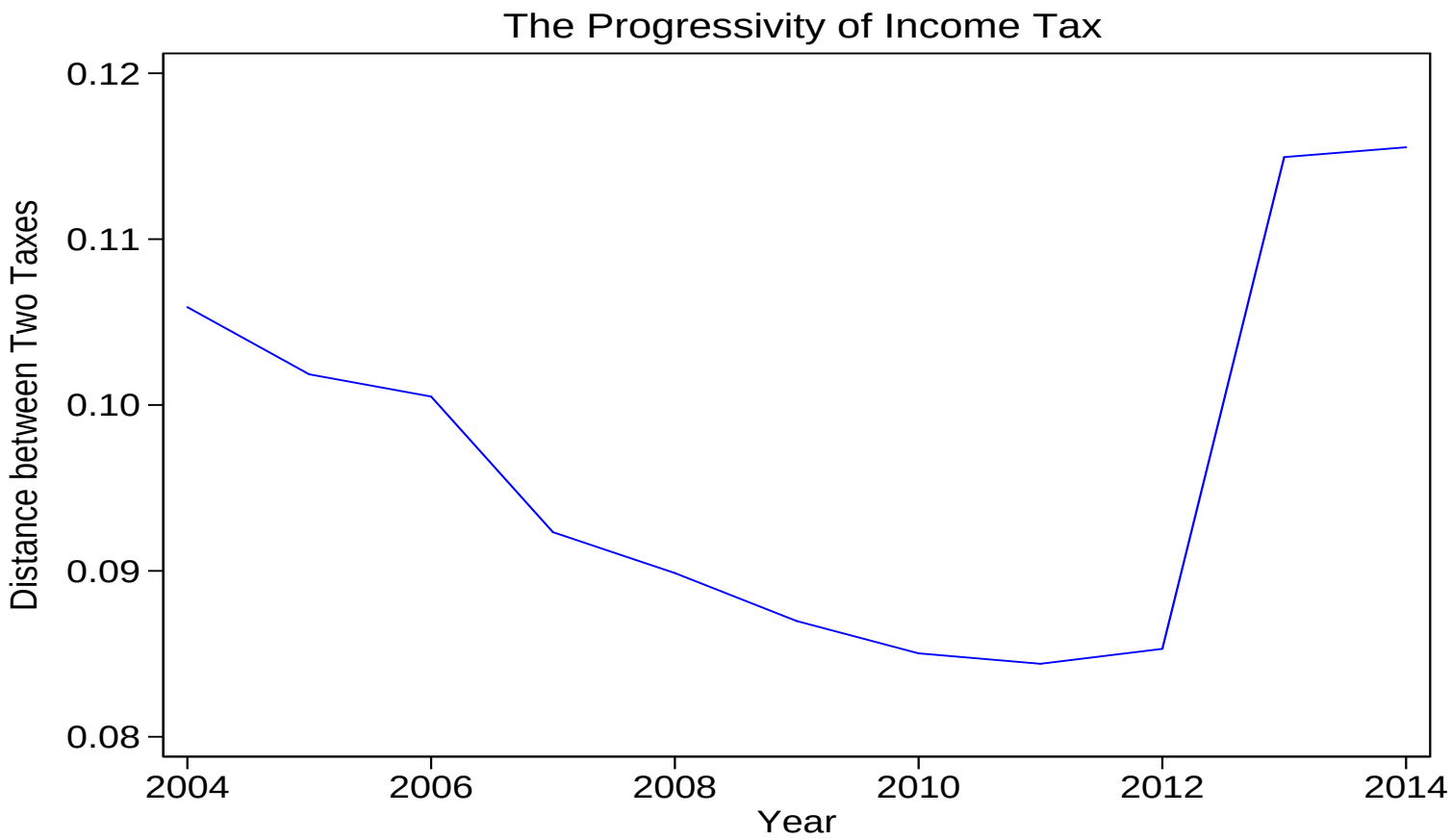




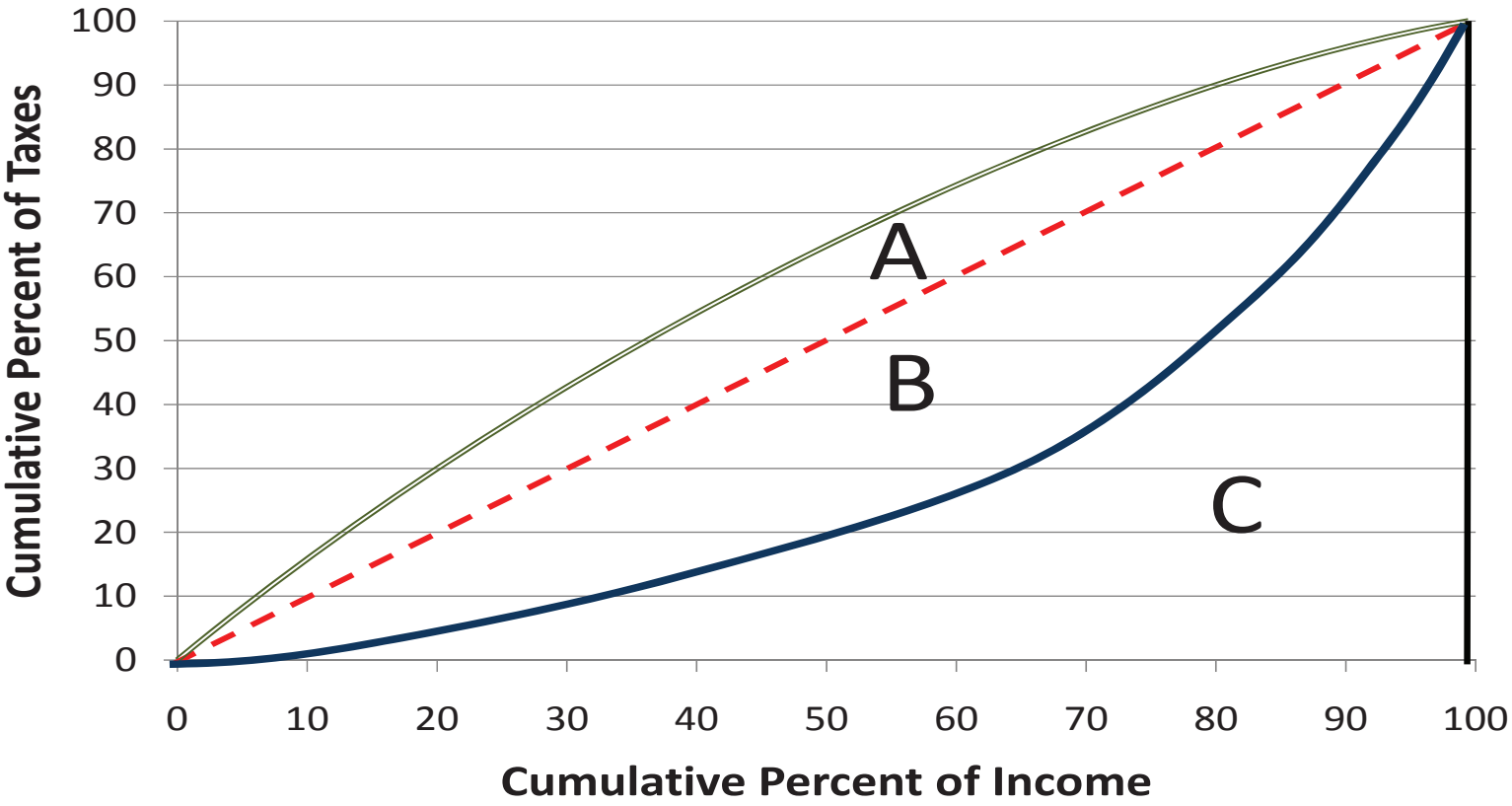
Tax Progressivity: How to Measure?

- Simple measure: Marginal tax rate relative to average tax rate
  - Average distance between two tax rates
- Suits index: Suits (1977)
  - Similar to the Gini coefficient approach
  - Tax contribution relative to income

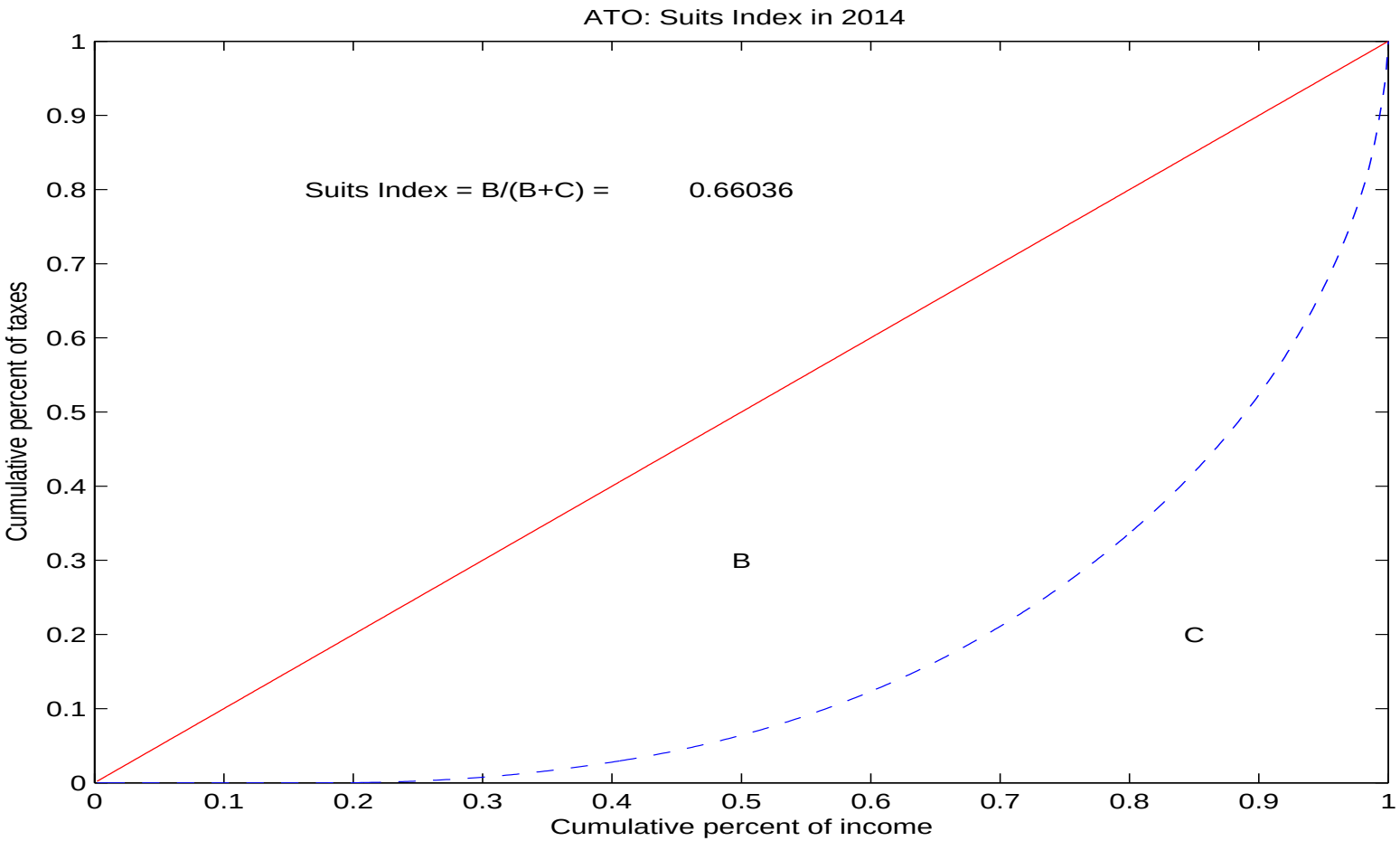
Tax Progressivity: Simple Measure



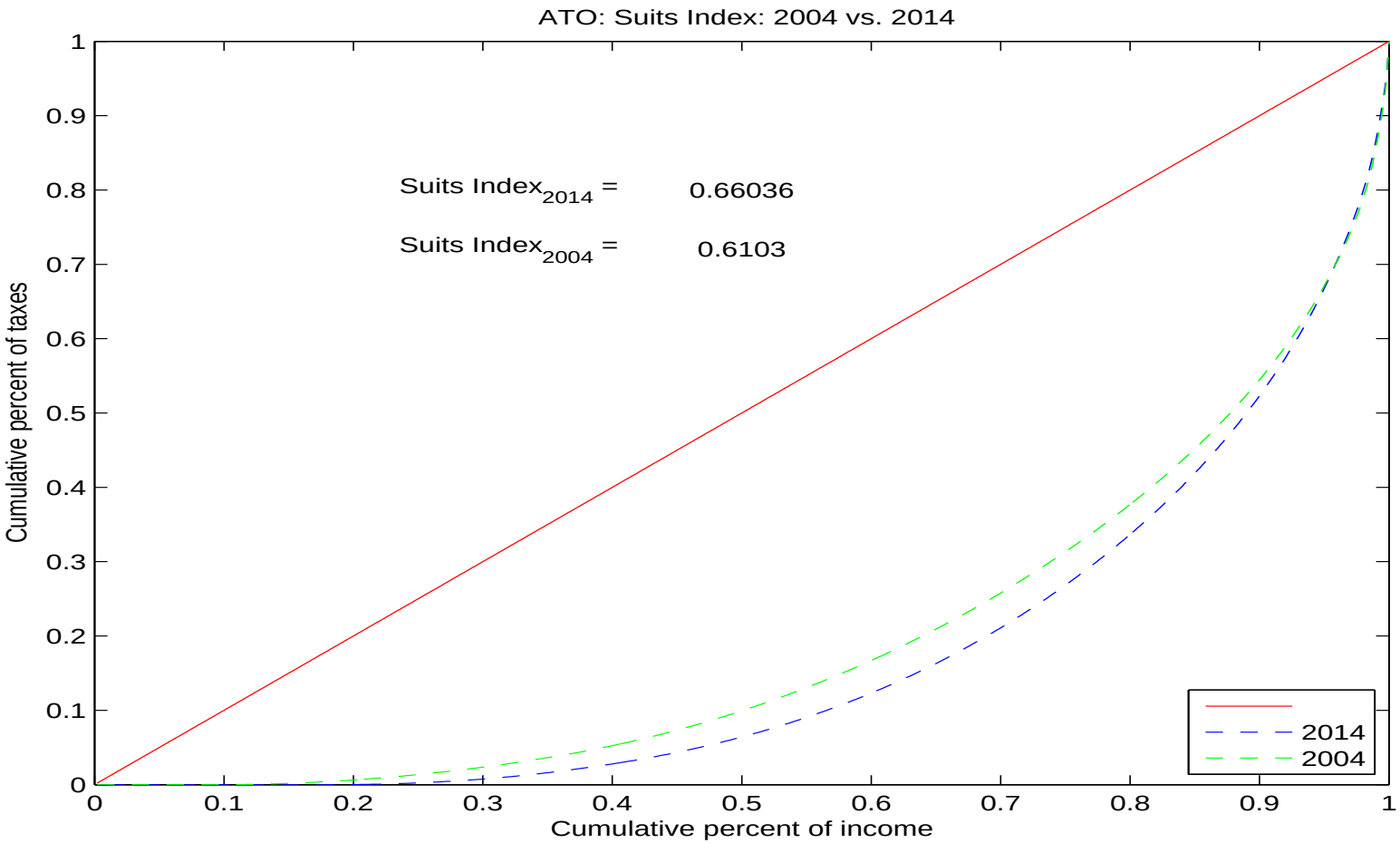
Tax Progressivity: Suits Index



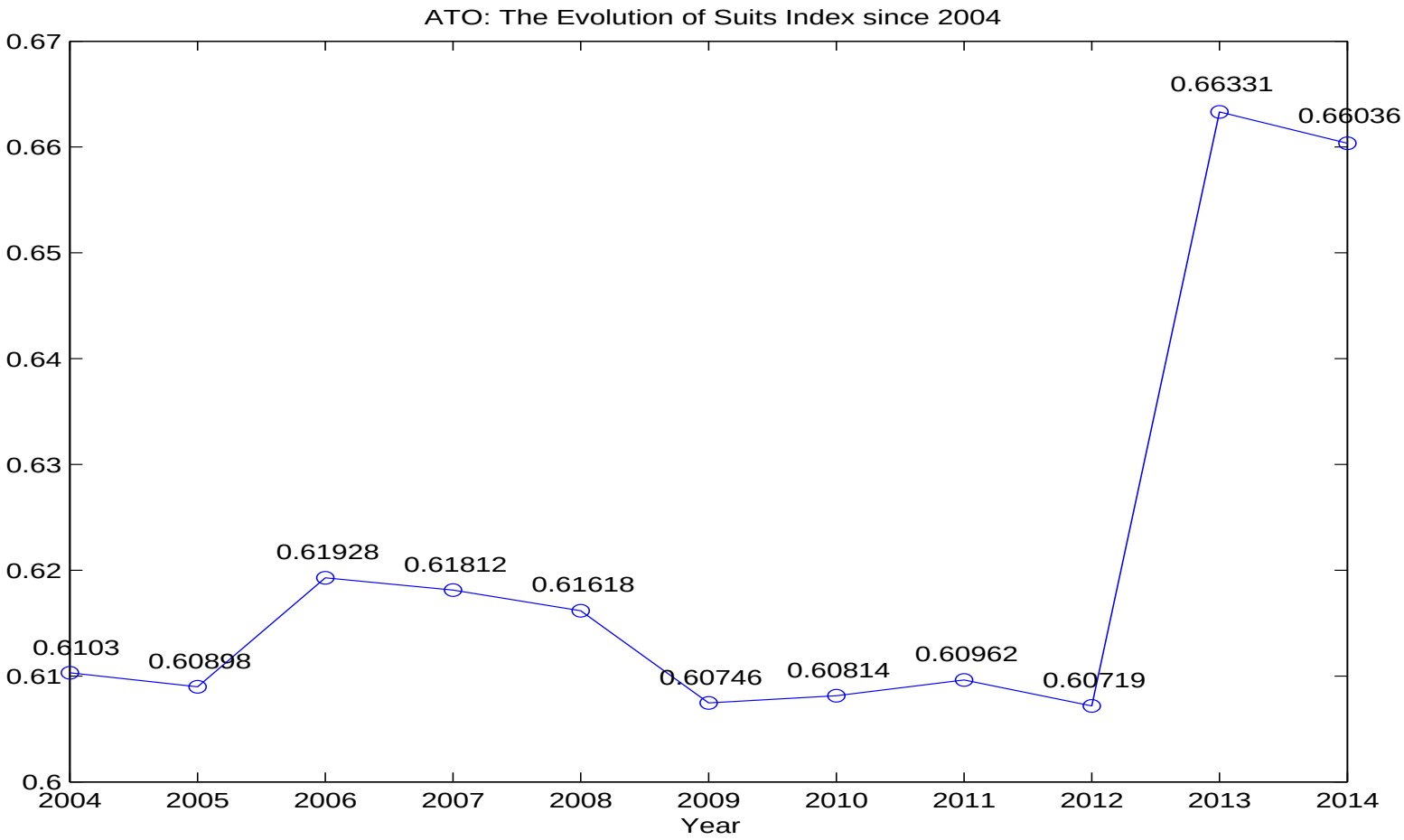
Tax Progressivity: Suits Index in 2014



Suits Index for Income Tax: 2014 vs 2004



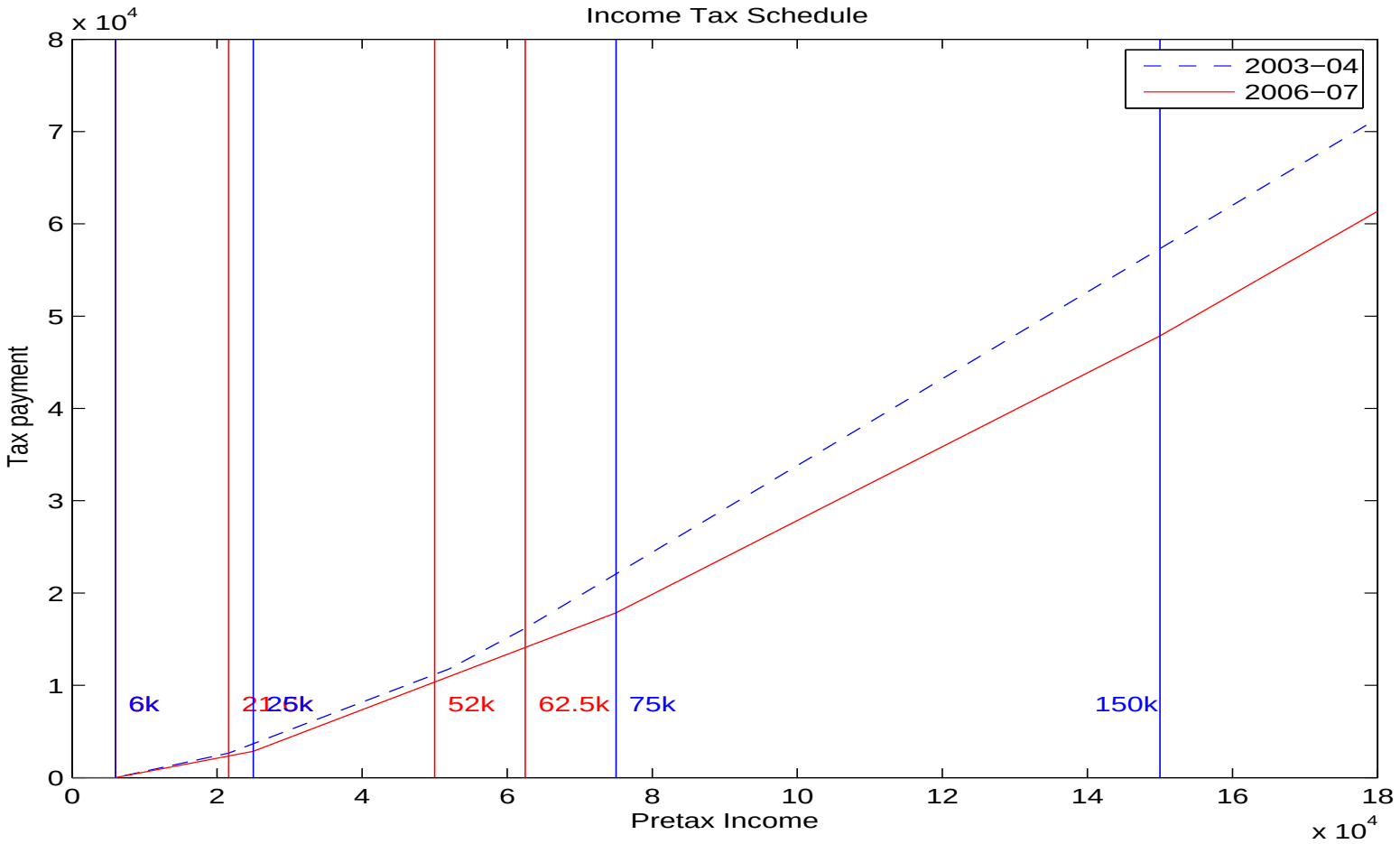
Evolution of Suits Index from 2004 to 2014



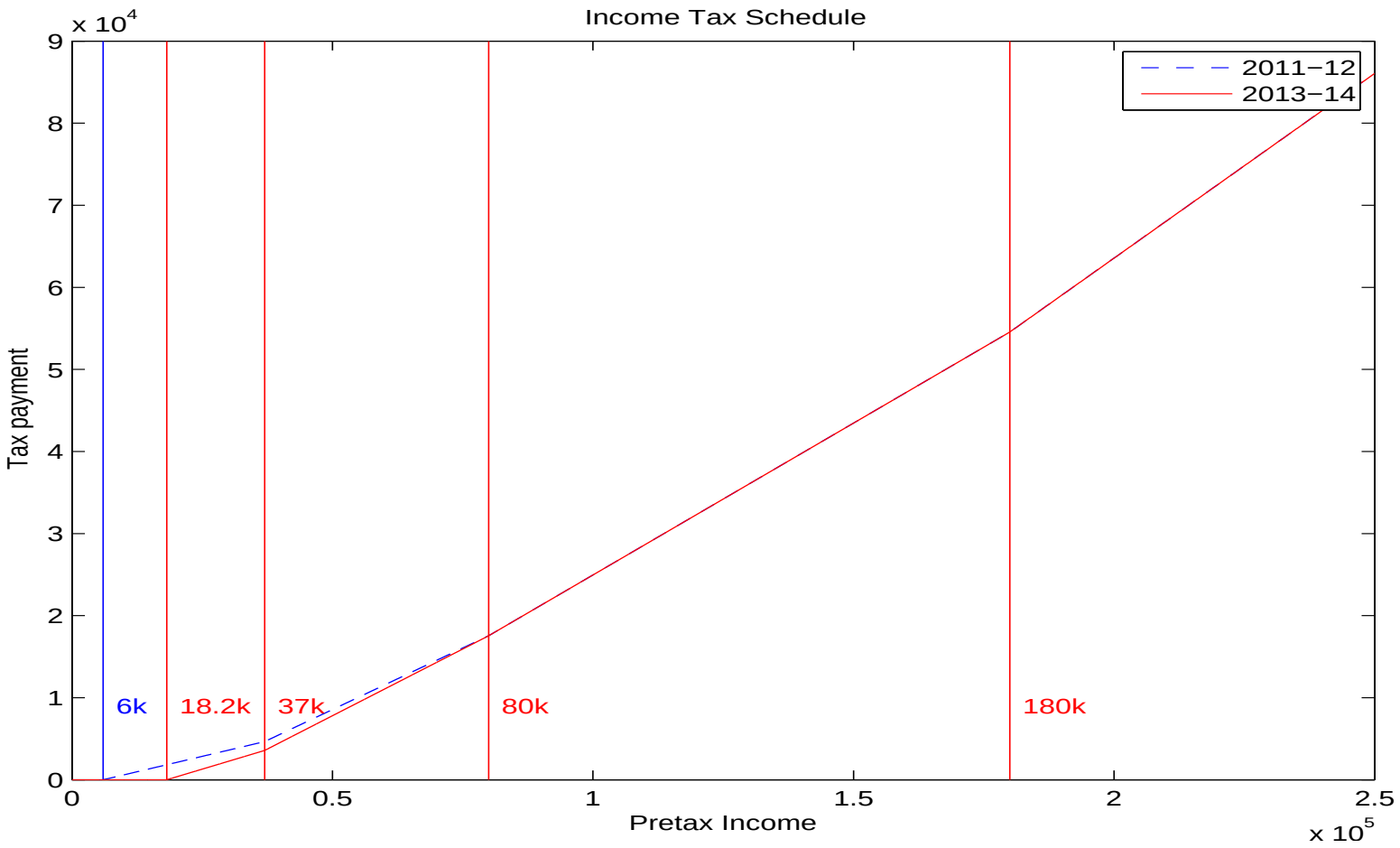
Changes in Tax Progressivity: Driving Forces

1. Tax reforms: marginal tax rates and income thresholds
2. Real income growth or productivity growth
3. Inflation

Tax Cut for the Rich between 2004 to 2007



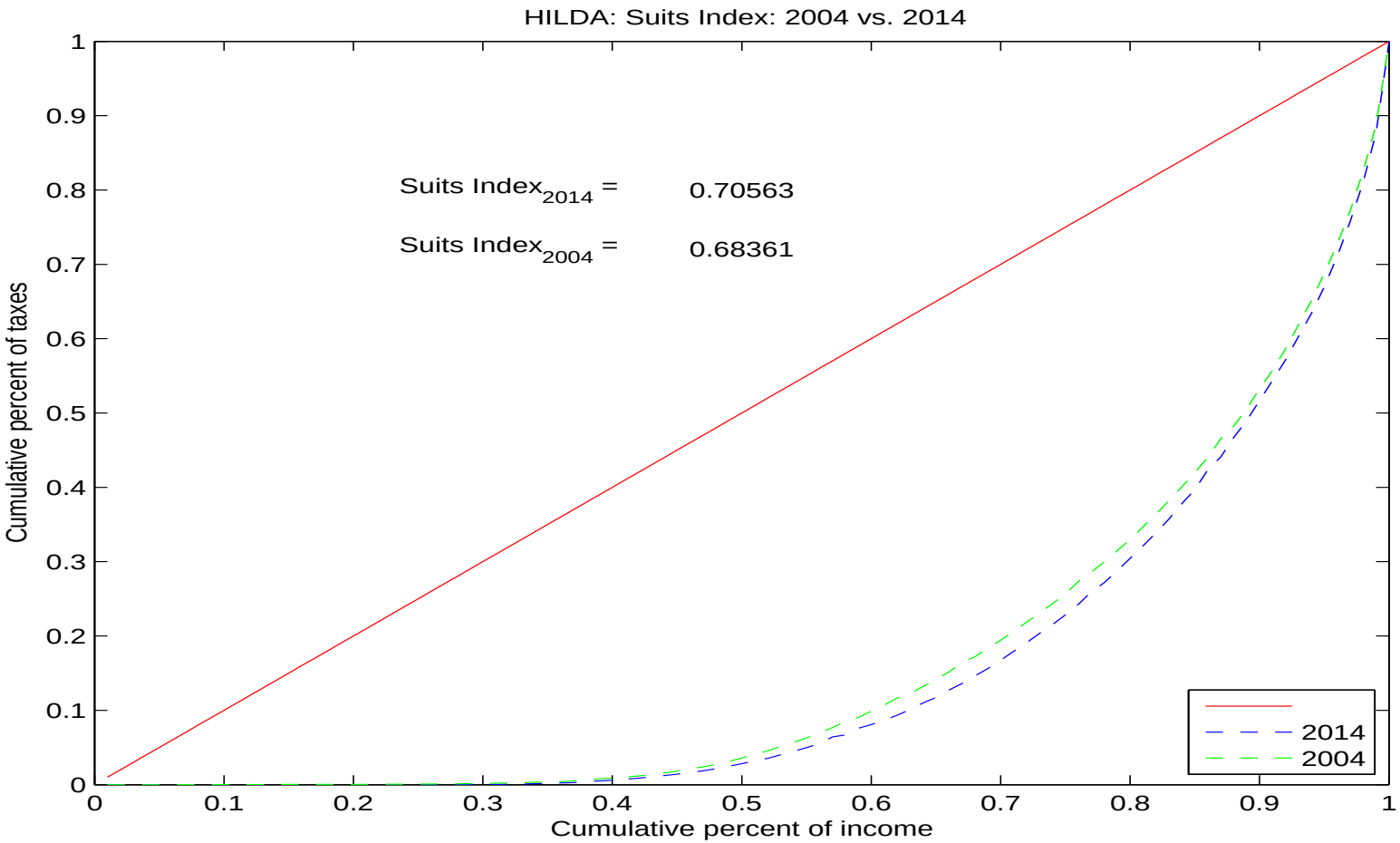
Tax Cut for the Poor in 2013



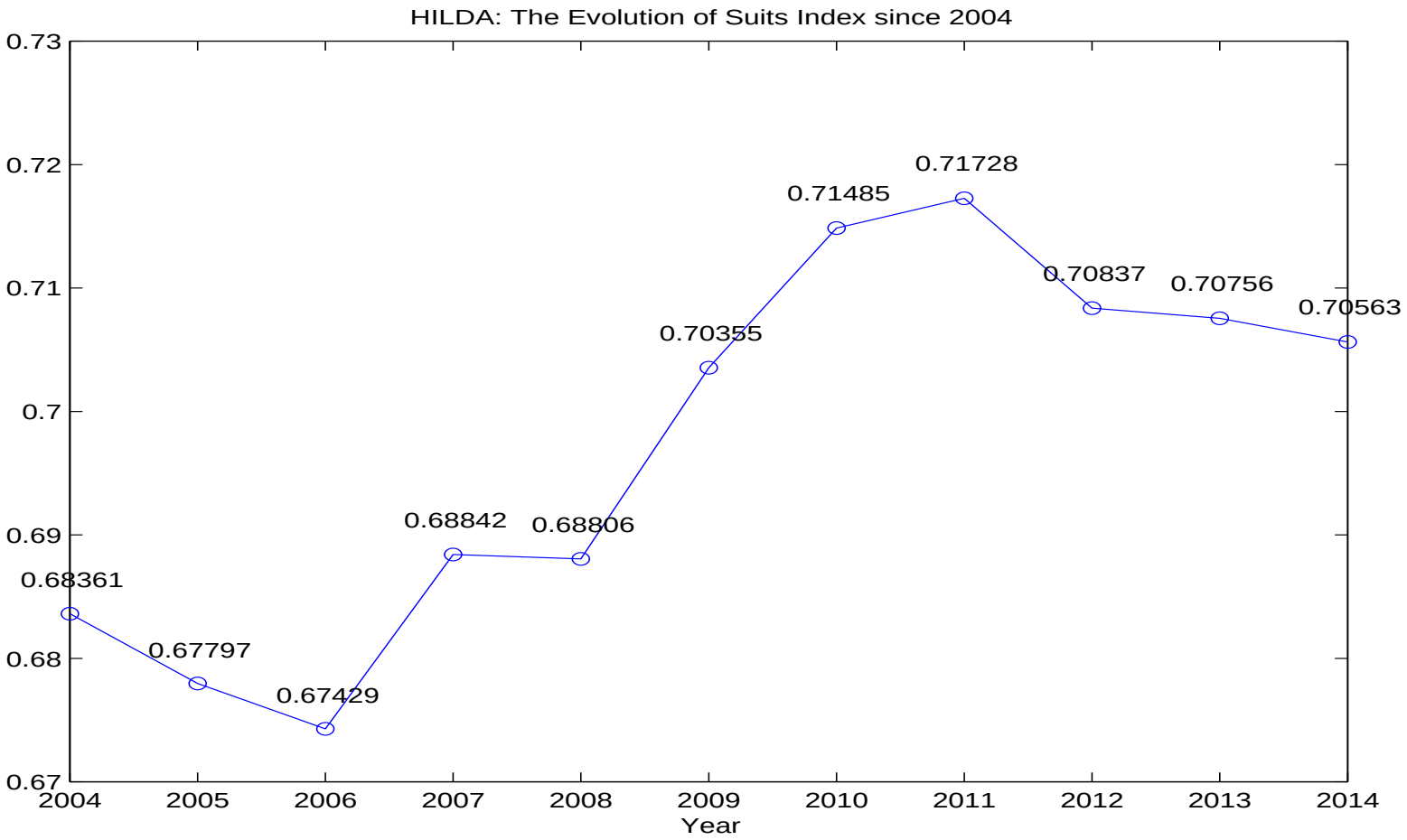
HILDA: Overview

- 15 waves between 2001-2015
- Panel data
- Wave 1: 7,682 households with approximately 15,127 individuals
- Information: Health, incomes and demographics
- Our sample: from 2004 to 2014 with individuals between the age of 20 and 90

Suits Index Based on HILDA: 2004 vs 2014



Suits Index from 2004 to 2014 using HILDA



Parametric Income Tax Function I

- Let $T(y)$ be tax revenues at income level y.
- We assume that the parametric income tax function has form of

$$T(y) = y - \lambda y^{1-\tau},$$

  where the parameter τ determines the degree of progressivity of the tax system.

- This specification has a long tradition in public finance (e.g. Feldstein (1969) and Benabou (2000, 2002))

Parametric Income Tax Function II

- The after tax income is given by

$$\widehat{y} \quad = \quad \lambda y^{1-\tau}.$$

- We estimate τ and λ by least squares using the following log form

$$\log \widehat{y}_i = \log \lambda + (1 - \tau) \log y_i + \varepsilon_i,$$

where, the error term, ε_i, follows a normal distribution.

Estimation using ATO Data in 2014

Variable	Mean	(Std. Dev.)	Min.	Max.	N
tot_inc_amt	51632.711	(38438.791)	0	199951	251269
net_inc_amt	42401.437	(27499.326)	0	198130.953	251269
log_net_inc	10.333	(1.095)	0	12.197	249936
log_gross_inc	10.463	(1.173)	0	12.206	249936

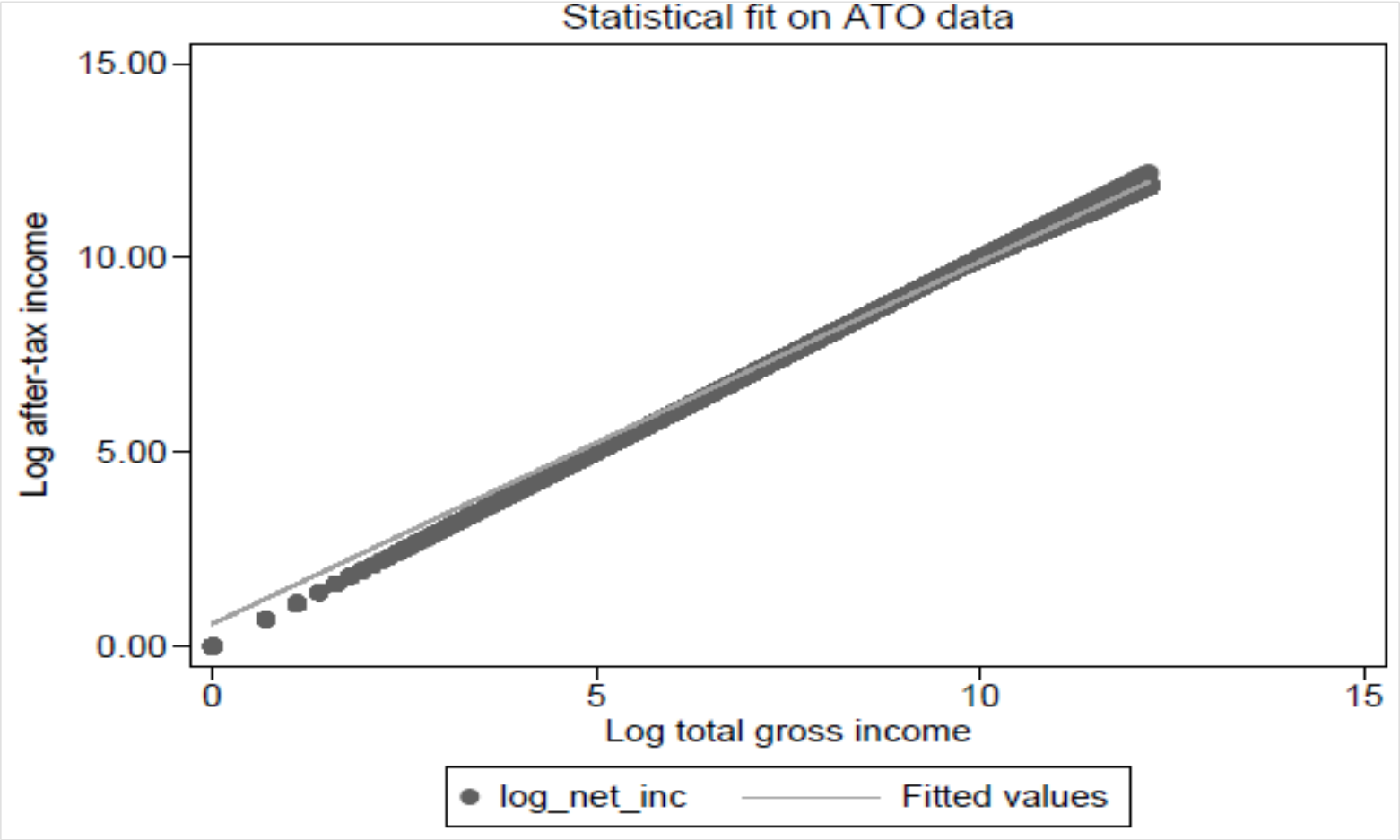
Table: Estimation: Data Summary Statistics in 2014

Estimation Result

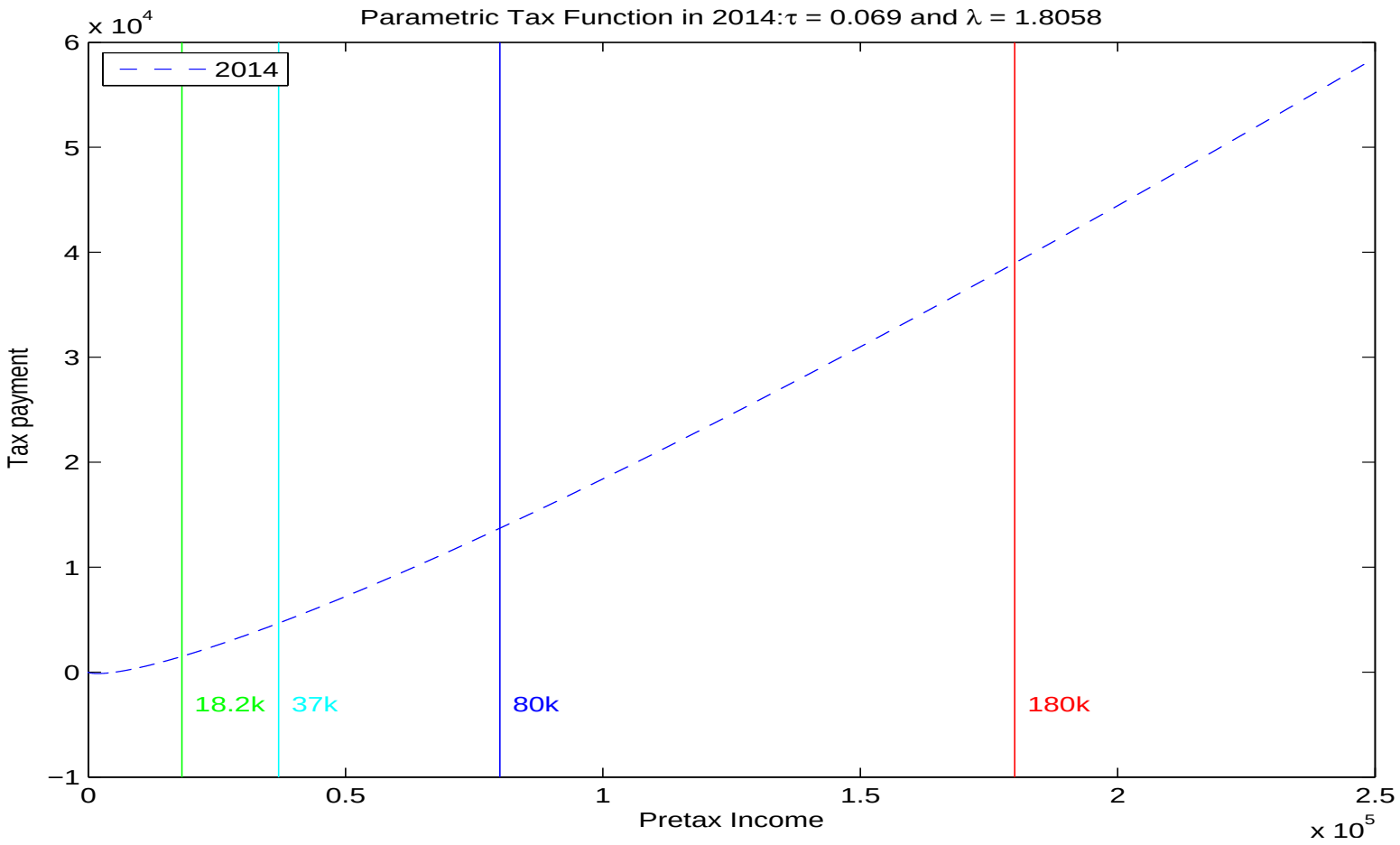
VARIABLES	(1) Model 1
log_gross_inc	0.932***
	(0.000111)
Constant	0.577***
	(0.00117)
Observations	249,936
R-squared	0.996

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

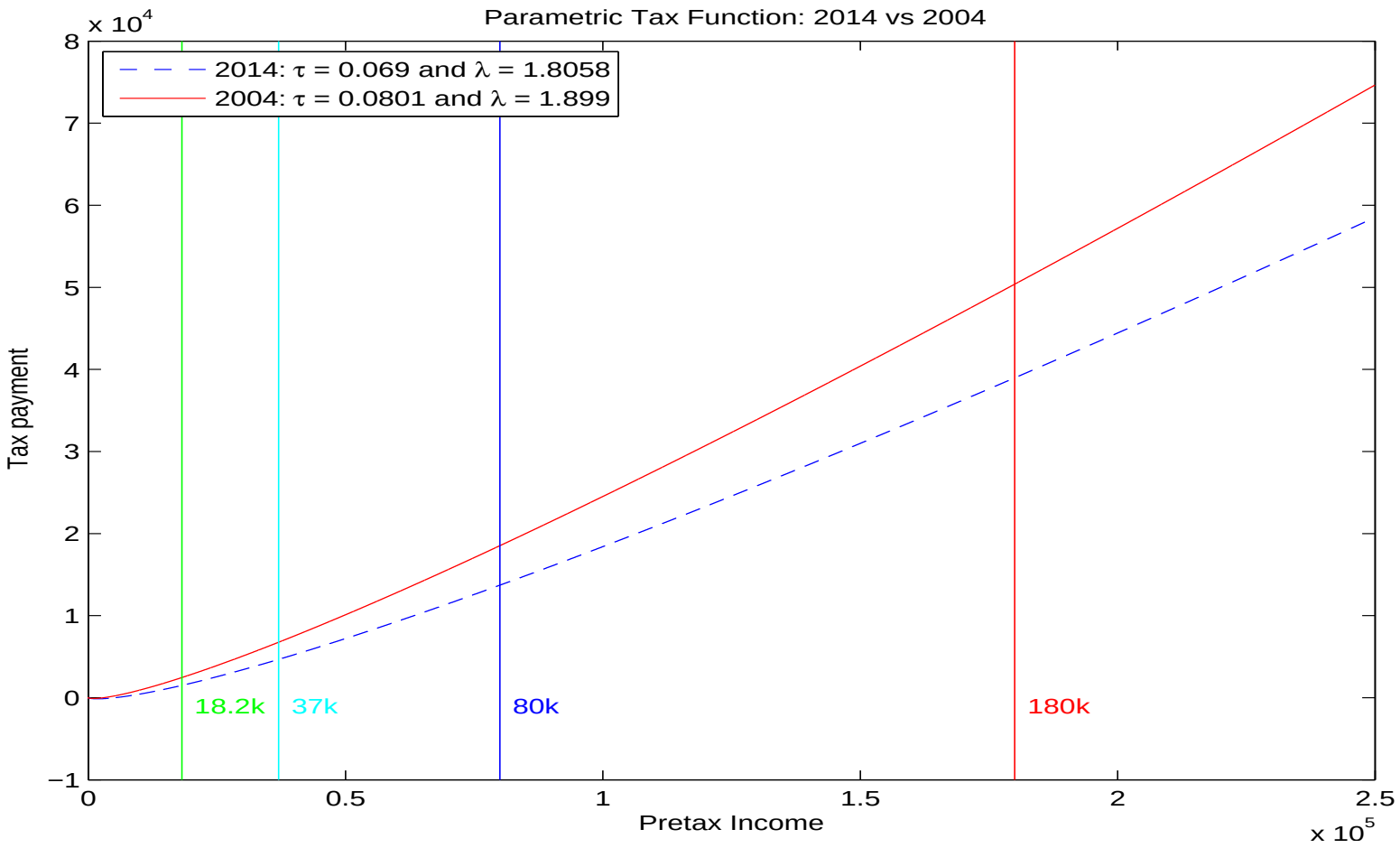
Statistical Fit



Estimated Parametric Tax Function in 2014



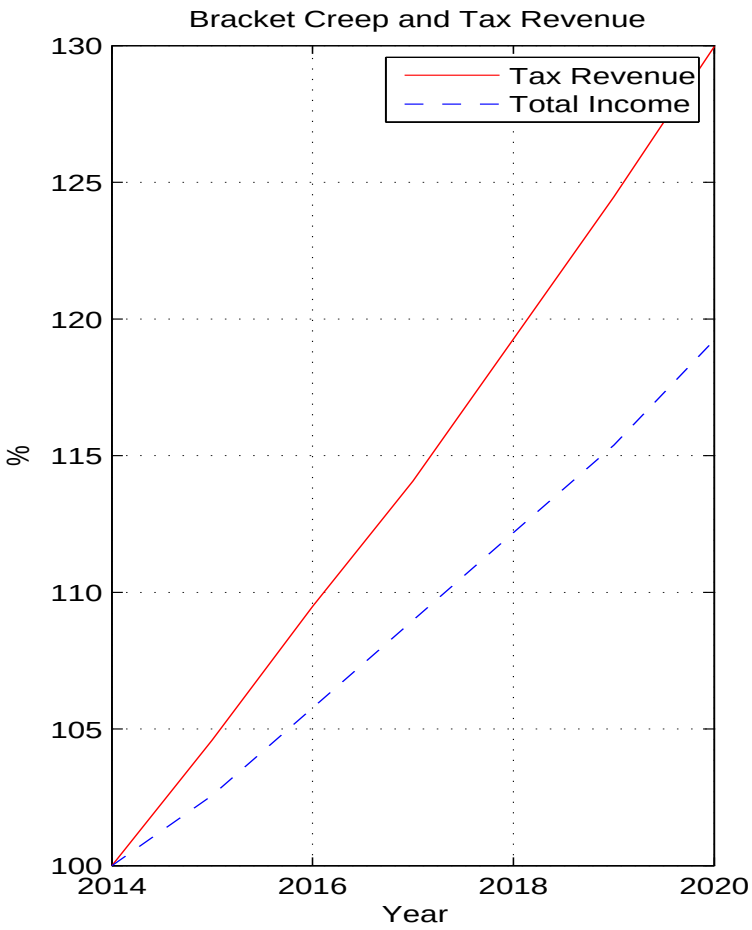
Estimated Parametric Tax Function: 2014 vs 2004

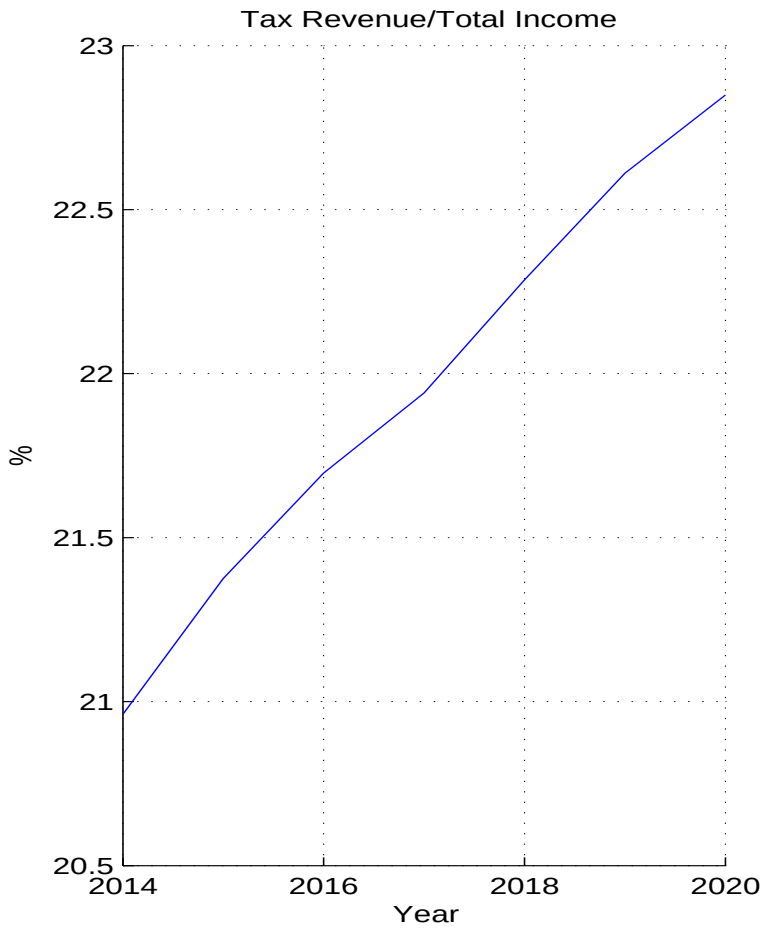


Experiment: Bracket Creep, Revenue and Progressivity

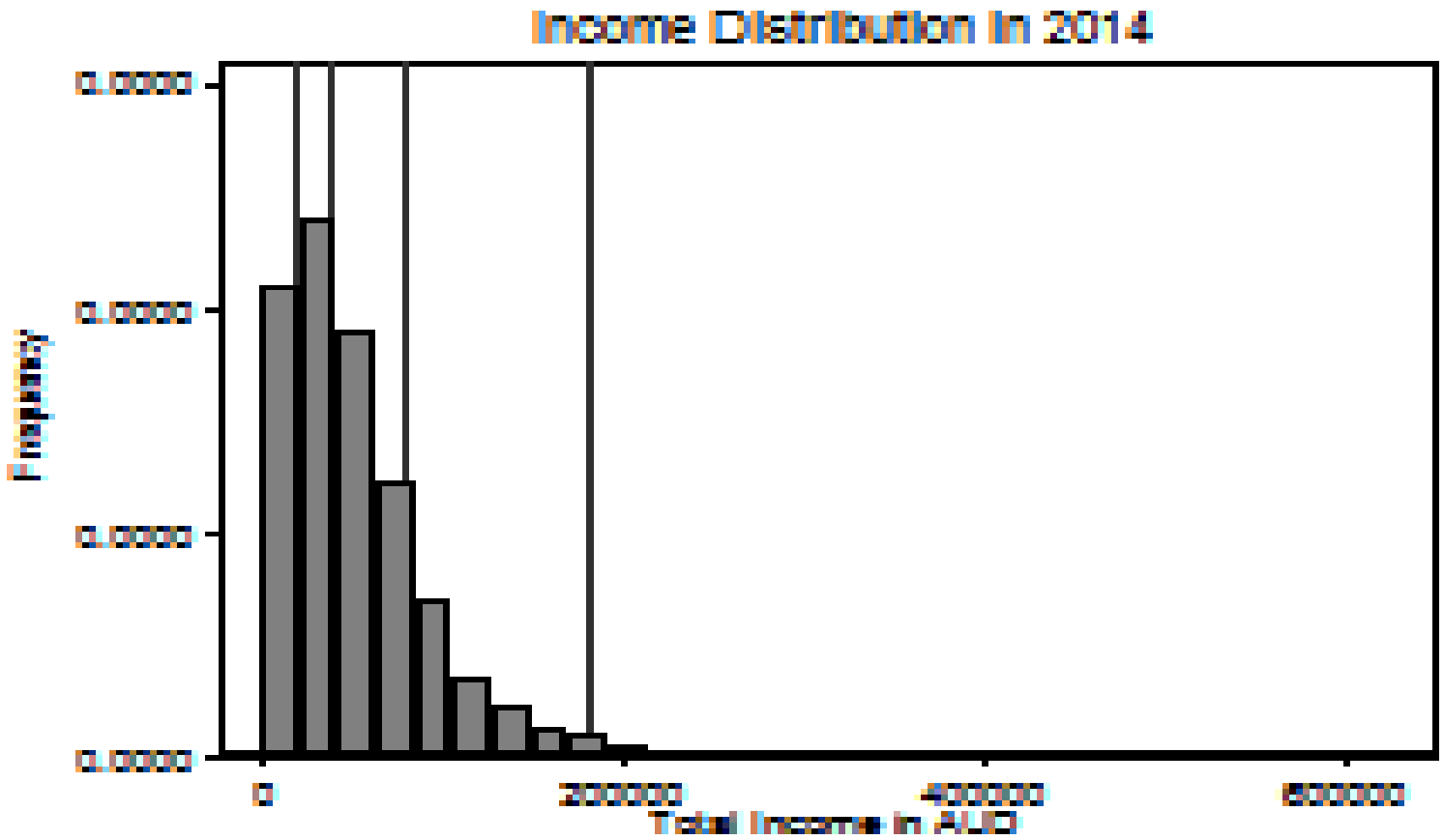
- Income growth: 3 percent annually between 2015-2002
- Income tax schedule: kept unchanged since 2016
- The effects on tax revenues and progressivity?

Bracket Creep and Tax Revenue

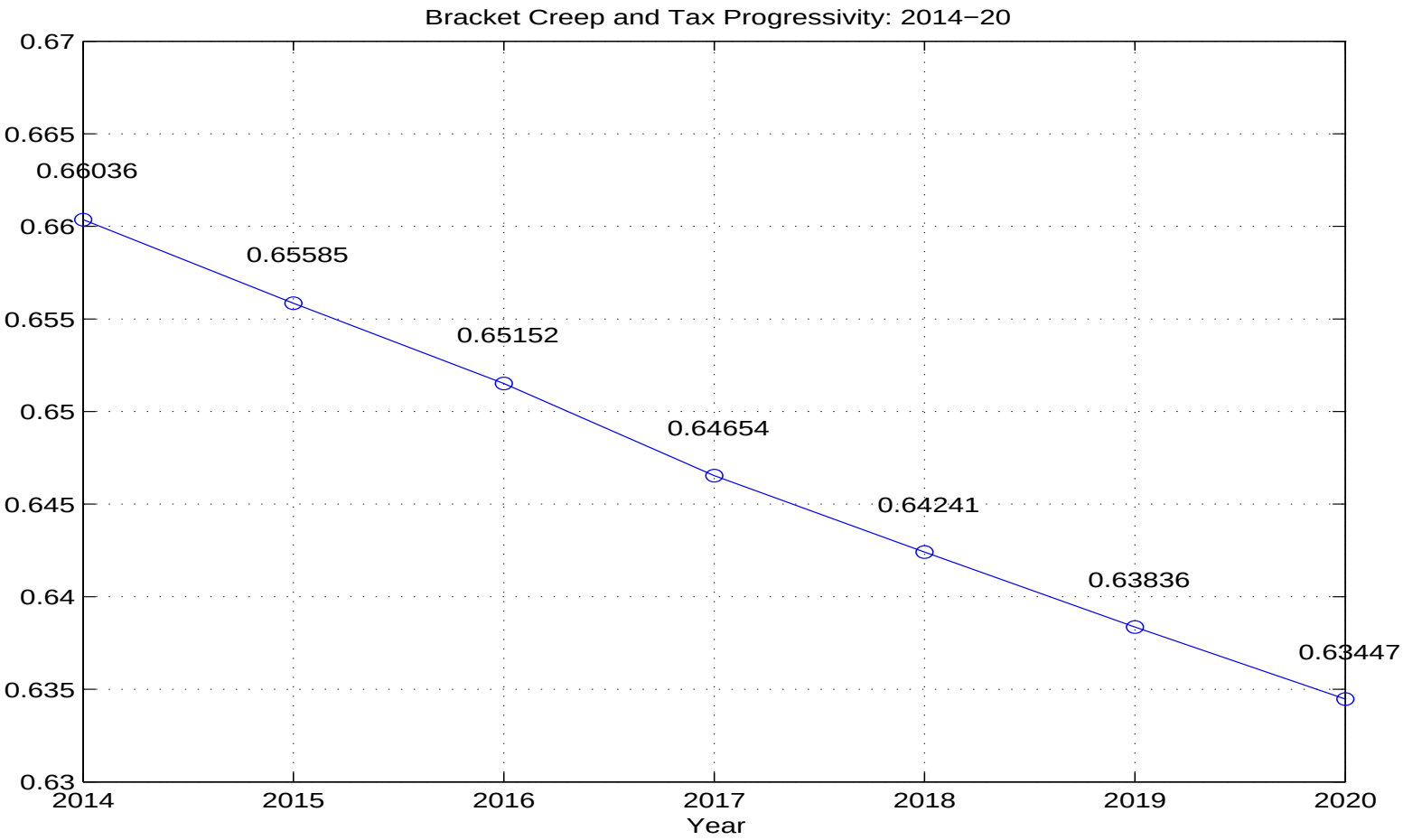




Income Distribution in 2014



Bracket Creep and Tax Progressivity



Conclusion

- Provide measurements of progressivity of Australia's individuals income tax system
- Findings:
  - The progressivity of the individuals income tax system has changed significantly, especially since 2012.
  - The bracket creep policy increases revenue, but reduces the progressivity of the individual income tax system

Next Steps

- Accounting for levies and tax offsets
- Accounting for transfers: family benefits, unemployment benefits, pension payments and others
- More comprehensive data sets: ATO tax data, DSS data
- A more challenging question: What is the optimal level of tax progressivity?