

Average tax rates on consumption, investment, labor and capital in the OECD 1950-2003

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Abstract

This paper provides a method for calculating average tax rates using national account statistics as a primary source. Series of tax rates on labor income, capital income, consumption expenditures and investment expenditures are calculated for 15 OECD countries for the period 1950-2003. Tax estimates are reconciled with existing average tax rates calculated by Mendoza, Razin and Tesar (1994) and Carey and Rabesona (2002).

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1 Introduction

Tax policy has been recognized as very influential in determining labor market outcomes and other macroeconomic aggregates. Recent papers, Prescott (2004), Ohanian et al. (2006)¹, Consea and Kehoe (2004) have shown labor tax rates are very important for explaining differences and fluctuations in hours worked across countries. The benchmark model for analysis of policy in those three papers in the representative agent neo-classical growth model. The goal of this paper is the provision of a long time series of average tax rates comparable across time and years that can be used to add to the existing literature on the effects of tax policy. This paper presents a series of average tax rates on consumption, investment, labor and capital for 15 OECD countries over the period 1950-2003. These tax series are comparable across countries and time.

Tax series of this kind for consumption, labor and capital income have been calculated by Mendoza et al. (1994) and subsequently updated by Carey and Rabesona (2002). Mendoza et al. provide a method for calculating average tax rates that does not rely on data from individual tax returns or taxes paid by income bracket. Tax rates are calculated by dividing tax revenues by income or expenditure. Mendoza et al. calculate average tax rates. Mendoza et al. collect data on tax revenues from OECD (2005b) and income and expenditures data come from national accounts.

Tax rates presented in this paper are calculated in a similar fashion. However, the sources for tax revenues, income and expenditures are all national account publications. The advantage of using national account publications is data availability. OECD Revenue Statistics are available beginning in 1965. Using national account publications, series are constructed as early as 1950. If national account publications are available, the method employed in this paper can be applied to earlier years or to other countries. In section 5, tax

¹Ohanian et al. use tax series from an earlier version of this paper

rates are compared to those calculated by Mendoza et al. For overlapping years, differences in average tax rate estimates are more driven by income choice and treatment of property taxes than by the source of tax revenue data.

The next section presents a neo-classical growth model with taxes on consumption, investment, labor and capital income. Section 3 details the method used to compute tax rates, section 4 discusses data sources and issues and displays the calculated tax rates. Section 5 reconciles differences in tax rates calculated for this paper with estimates by Mendoza et al., section 6 compares average tax estimates with average marginal tax rates and section 7 concludes the paper.

2 Taxes in a neo-classical framework

The calculation of tax rates provided in this paper was motivated by their use in the neo-classical growth model. There are uses outside of this framework, but the tax rates here can be easily interpreted in the following model. Consider the neo-classical growth model with taxes on consumption, investment, capital income and labor income. Assume that tax revenues collected by the government finance government spending, g , and a lump-sum transfer, T . The household solves

$$\begin{aligned} \max_{i_t, c_t, h_t} \quad & \sum_{t=0}^{\infty} \beta^t u(c_t, g_t, 1 - h_t) \\ \text{s.t} \quad & \\ (1 + \tau_t^c)c_t + (1 + \tau_t^x)x_t &= (1 - \tau_t^h)h_t w_t + (1 - \tau_t^k)r_t k_t + T_t \\ k_{t+1} &= x_t + (1 - \delta)k_t \end{aligned}$$

τ^c is a tax on the consumption good, τ^x on investment, τ^h on labor income and τ^k on capital income. As described above, T is the lump-sum transfer from the government and g is spending by the government. The consumption and investment good are produced by a single firm that solves the following problem each period

$$\begin{aligned} \max_{k_t, h_t} \quad & y_t - r_t k_t - w_t h_t \\ \text{s.t.} \quad & y_t = A k_t^{\theta_t} h_t^{1-\theta_t} \end{aligned}$$

Tax rates calculated in the next section can be interpreted as τ^h , τ^c , τ^x and τ^k described above.

3 Calculating tax rates

The tax rates calculated in this paper are average tax rates. The general strategy employed is as follows. First total income is categorized as labor income or capital income and private expenditures are categorized as consumption or investment. Second, tax revenues are classified as revenues generated from taxes on labor income, capital income, private consumption expenditures or private investment. To find a given tax rate, I divide each category of tax revenue by the corresponding income or expenditure. Since I compute tax rates in the same fashion each year, I drop time subscripts for the rest of this section.

Data on tax revenues, income and expenditures come from national account statistics. Table 1 displays all tax revenues, domestic income, and private expenditures from *OECD National Accounts Volume II, Detailed Tables 2005* used to calculate tax rates from 1992-2003. “hh” denotes a value comes from the household accounts, “gov” from the government accounts and “corp” from corporate accounts. In any given year, total tax revenues collected by the government are the sum of taxes on production and imports (TPI), social security

Table 1: SNA 1993 National Account Data

Value	Account Entries
<i>GDP</i>	Gross Domestic Product
<i>TPI</i>	Taxes on production and imports
<i>Sub</i>	Subsidies
<i>W</i>	Compensation of employees
<i>OS</i>	Gross operating surplus and mixed income
<i>OSPUE</i>	(hh) Gross operating surplus and mixed income
<i>OSGOV</i>	(gov) Operating surplus, net + consumption of fixed capital
<i>C</i>	Household final consumption expenditure
<i>I (private)</i>	Gross capital formation - (gov) Gross capital formation
<i>Dep</i>	Consumption of fixed capital
<i>HHT</i>	(hh) Taxes on income and profits
<i>SS</i>	(gov) Actual Social contributions, receivable
<i>CT</i>	(corp) Current taxes on income and wealth, payable

contributions (*SS*), direct taxes on households (*HHT*), and direct taxes on corporations (*CT*). The following sections detail the steps I take to categorize these tax revenues and calculate average tax rates.

3.1 Labor income tax

The average tax rate on labor income is found by dividing labor income tax revenues by economy-wide labor income. To compute the labor income tax rate, I need to calculate labor income tax revenues and labor income.

Labor income tax revenues come from two sources: the household income tax and social security taxes. However, household income taxes represent taxes on total income. Since only a portion of this income is generated from labor, only a portion of these taxes reflect taxes on labor income. Unfortunately, the national accounts do not break down household income taxes according to type of income. For this reason, papers calculating average tax rates on labor and capital income based on aggregate data make the assumption that the tax rate on household labor income is the same as the tax rate on household capital income². I adopt

²Mendoza et al. (1994), discusses this assumption and concludes that it is a good approximation based

the same assumption.

The income tax rate is found by dividing total taxes on income of the household, HHT , by total household income in each period. Household income is defined as gross domestic product less net taxes on production and imports, or $GDP - (TPI - Sub)$. The household income tax rate is therefore measured as

$$\tau^{inc} = \frac{HHT}{GDP - (TPI - Sub)} \quad (1)$$

It remains to divide income into payment to capital and payment to labor. Let θ be the share of income attributed to capital, with the remaining $(1 - \theta)$ share attributed to labor. Payment to labor is in turn made up of two components: compensation of employees, and a share of income earned by the self-employed. The self-employed earn income from their own labor as well as from capital. The national accounts entry for income earned by the self-employed, operating surplus of private unincorporated enterprises ($OSPUE$), does not distinguish between the sources of income. Here it is assumed that the share of $OSPUE$ attributed to labor is the same as the share of aggregate income attributed to labor in the whole economy. This implies the following accounting identity

$$(1 - \theta)(GDP - (TPI - Sub)) = W + (1 - \theta)OSPUE \quad (2)$$

Solving (2) for $(1 - \theta)$ yields

$$(1 - \theta) = \frac{W}{GDP - (TPI - Sub) - OSPUE} \quad (3)$$

on evidence in OECD (1991)

Total household income taxes paid on labor income are represented by

$$HHT_L = \tau^{inc}(1 - \theta)(GDP - (TPI - Sub)) \quad (4)$$

The second source of tax revenue generated from taxes on labor income are social security taxes, SS . Since this corresponds to an exact entry in the national accounts, no further adjustment is required. Social security taxes combined with HHT_L represent total tax revenues that are classified as taxes paid on labor income, so the average tax rate on labor income is measured as

$$\tau^h = \frac{SS + HHT_L}{(1 - \theta)(GDP - (TPI - Sub))} \quad (5)$$

3.2 Consumption and investment tax rates

Revenue collected from taxes levied on consumption and investment expenditures are included in taxes on production and imports, TPI . Consumption and investment expenditures are subsidized by the amount Sub . TPI includes general taxes on goods and services, excise taxes, import duties and property taxes. The task remains to properly allocate TPI to the relevant tax revenue category. This requires that I address two issues: treatment of property taxes, and proper division of TPI across consumption and investment.

Before allocating TPI across consumption and investment, I address property taxes. Property taxes can be thought of as taxes on services provided by the assets taxed, and therefore a tax on consumption. Alternatively, property taxes can be thought of as capital taxes. I choose to interpret property taxes in both ways, depending on the type of entity taxed. I interpret property taxes paid by households as taxes levied on owner occupied housing services. Housing services are treated as consumption in the national accounts, so it is natural to interpret taxes on these services as consumption taxes. Property taxes paid by businesses are interpreted as capital income taxes.

National account statistics do not provide entries for property taxes. I look to the *OECD Revenue Statistics*, OECD (2005b) to break down the components of TPI from 1965 onward. Property taxes in *Revenue Statistics* are separated into two entries: property taxes paid by households and property taxes paid by other entities. Property taxes paid by other entities are interpreted as property taxes paid by businesses and represent a non-negligible share of total tax revenue in Australia, Canada, Japan, the United Kingdom and the United States³. For relevant countries, I compute the share of *TPI* that can be attributed to property taxes paid by other entities at five year frequency for the period 1965-2000. These shares differ across countries but vary little across time. For each country, I take the average over time to define μ , the share of *TPI* that represents property taxes paid by entities other than households. Table 2 displays the value calculated for μ in Australia, Canada, Japan, the United Kingdom and the United States. In all other countries, μ is zero. Tax revenue μTPI

Australia	0.119
Canada	0.134
Japan	0.105
United Kingdom	0.146
United States	0.204

is allocated to capital. Tax revenues that fall on consumption and investment are therefore

$$\widetilde{TPI} = (1 - \mu)TPI \tag{6}$$

The next step is to allocate \widetilde{TPI} between consumption and investment. \widetilde{TPI} includes the following components: Property taxes paid by households, general taxes on goods and services, excise taxes, customs and import duties, taxes on specific services and taxes on the use of goods to perform activities. While \widetilde{TPI} includes all of the previous taxes, it is not broken down in the national accounts. Without looking to additional sources for a breakdown

³In all other countries, property taxes paid by other entities represent less than 1% of total tax revenue

on \widetilde{TPI} , I could choose to allocate all of \widetilde{TPI} to consumption taxes. Alternatively, I could choose to split \widetilde{TPI} across consumption and investment according to the consumption and investment share of private expenditures. The first option would lead to overestimation of the consumption tax rate. Some taxes, like import duties and general taxes, fall on investment expenditures as well as consumption. Splitting up \widetilde{TPI} according to share in private output would lead to underestimation of the consumption tax rate. Some taxes, like property taxes paid by households and excise taxes fall only on consumption expenditures.

Instead of relying on national account data and either overestimating or underestimating the consumption tax rate, I look for more details about the components of \widetilde{TPI} . *OECD Revenue Statistics* OECD (2005b) break down the components of \widetilde{TPI} . The left columns of table 3 show the entries from OECD (2005b). Some of the the taxes included in \widetilde{TPI} fall only on consumption expenditures. Others fall on both consumption and investment expenditures. I assume revenue from taxes that fall on both consumption and investment expenditures are split between consumption tax revenue and investment tax revenue according to consumption and investment share in private expenditures. For the countries included in this paper, there are no components of \widetilde{TPI} that fall strictly on investment. The right column of table 3 displays the allocation of the components of \widetilde{TPI} .

Taxes that fall strictly on consumption are property taxes paid by households, excise taxes and taxes on specific services. Property taxes paid by households are considered taxes on the services provided by owner occupied housing, which is treated as consumption in the national accounts. Excise taxes include taxes on sugar, alcohol, tobacco, and other consumption goods depending on the country. Taxes on specific services include taxes on entertainment, insurance, restaurant meals and casinos. These services are also considered consumption expenditure.

General taxes on goods and services, customs and import duties and taxes on the use of goods to perform activities are considered to be split between consumption and investment

Table 3: Components of \widetilde{TPI}

Reference #	Description	Allocation
4110	Recurrent taxes on immovable property paid by households	C
4120	Recurrent taxes on immovable property paid by other entities	capital income
5110	General taxes (includes sales and value added taxes)	C and I
5121	Excise taxes	C
5123	Customs and import duties	C and I
5126	Taxes on specific services	C
5200	Taxes on use of goods perform activities	C and I

according to share in private expenditure. General taxes include sales and value-added taxes. Along with customs and import duties, some of the goods produced or purchased subject to these taxes are investment goods. Taxes on use of goods to perform activities includes motor vehicle taxes, highway taxes, etc. These goods are used in the production of both investment goods and consumption goods.

After identifying taxes that fall strictly on consumption expenditures, I calculate their share, λ , of \widetilde{TPI} . I calculate λ at five year intervals over the period 1965-2000. λ does not vary much from period to period for each country, so I take the average to find the value I use in all years to calculate the part of $\widetilde{TPI} - Sub$ attributed to consumption, TPI_c . Table 4 lists the value of λ used for each country. Revenue collected from taxes levied on consumption expenditures is calculated as

$$TPI_c = \left(\lambda + (1 - \lambda) \left(\frac{C}{C + I} \right) \right) (\widetilde{TPI} - Sub) \quad (7)$$

Consumption expenditures are reported in the national accounts gross of taxes. Taxable consumption expenditures are then $C - TPI_c$ and the consumption tax is measured as

$$\tau^c = \frac{TPI_c}{C - TPI_c} \quad (8)$$

Since TPI_c represents revenue from consumption taxes, the remaining portion of $\widetilde{TPI} -$

Table 4: λ values

AUS	0.469	JPN	0.702
AUT	0.287	NLD	0.257
BEL	0.261	ESP	0.281
CAN	0.355	SWE	0.372
FIN	0.385	CHE	0.356
FRA	0.329	GBR	0.520
DEU	0.334	USA	0.506
ITA	0.276		

Sub is attributed to taxes on investment.

$$TPI_x = \widetilde{TPI} - Sub - TPI_c \quad (9)$$

Like consumption expenditures, investment expenditures are recorded gross of taxes. Pre-tax private investment expenditures are then $I - TPI_x$. So the investment tax ratio is

$$\tau^x = \frac{TPI_x}{I - TPI_x} \quad (10)$$

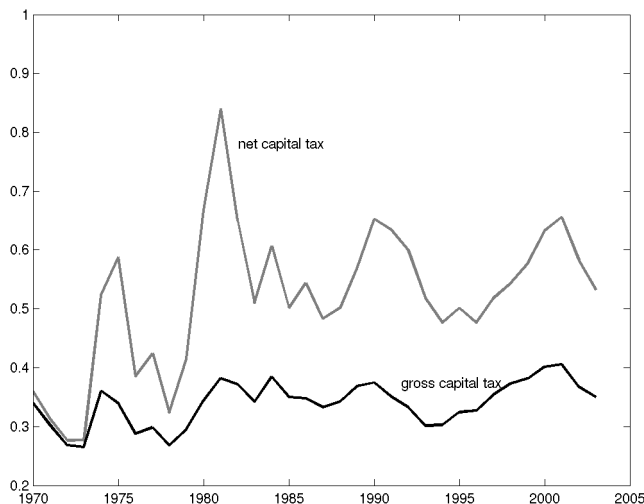
3.3 Capital income tax

As calculated in section 3.1, income paid to capital in the economy is $\theta(GDP - (TPI - Sub))$, where θ is calculated according to (3). This is equivalent to the sum of operating surplus earned by corporations, the capital share of operating surplus earned by private unincorporated enterprises, and operating surplus earned by the government, *i.e.*

$$\theta(GDP - (TPI - Sub)) = OSCORP + \theta OSPUE + OSGOV \quad (11)$$

$OSGOV$ is gross operating surplus earned by the government, and therefore is not subject to tax. Taxable capital income is therefore $\theta(GDP - (TPI - Sub)) - OSGOV$. Note that this is gross capital income, *i.e.*, no adjustments are made for the depreciation of capital.

Figure 1: Capital income tax rate in the United Kingdom



All countries for which tax rates are calculated in this paper have provisions that allow depreciation to be deducted from taxable capital income. The national accounts provide an entry for depreciation of capital: consumption of fixed capital. While it may seem reasonable to use this entry to calculate capital income net of depreciation, there are two issues with such an approach. First, consumption of fixed capital can vary widely relative to capital income across years for a given country. Calculating tax rates based on net income would produce tax rates that fluctuate a great deal on the basis of the variation of the entry for consumption of fixed capital. These fluctuations sometimes result in suspicious tax rates. Figure 1 shows average tax rates on capital income for the United Kingdom 1970-2003 calculated using income gross of depreciation and net. The average capital income tax rate calculated net of depreciation reaches levels above 80% in the 1980s. This might be reasonable if the tax rates were marginal, but is a suspiciously large tax rate given it is average.

The second issue may explain the strange fluctuations in tax rates calculated net of depreciation. The national accounts field consumption of fixed capital is not intended to be used as a measure of deductible depreciation. After 1992, consumption of fixed capital

is reported according to the 1993 SNA. Section 6.179 of *United Nations Statistics Division 1993* states

Consumption of fixed capital is defined in the System in a way that is intended to be theoretically appropriate and relevant for purposes of economic analysis. Its value may deviate considerably from depreciation as recorded in business accounts or as allowed for taxation purposes...

For the reasons stated above, I choose not to look to the national accounts for a value of deductible depreciation for tax purposes.⁴ Capital taxes presented in this paper are therefore taxes on gross capital income. While these may under represent average tax rates, they are more comparable across countries and time.

Capital tax revenues come from the following sources: taxes levied on corporate income, property taxes paid by entities other than households, and the household income tax. Household capital income is the capital share of *OSPUE* plus income transferred to the household from the corporate sector. As owners of corporations, households receive all after-tax corporate profits. Household capital income is then

$$\theta OSPUE + (OSCORP - CT) = \theta(GDP - (TPI - Sub)) - OSGOV - CT \quad (12)$$

By assumption, the household faces the same tax rate on capital income as labor income. Total capital tax revenue collected from the household is

$$HHT_C = \tau^{inc}(\theta(GDP - (TPI - Sub)) - OSGOV - CT) \quad (13)$$

In countries where there are property taxes paid by other entities, μTPI is part of capital

⁴Mendoza et al. calculate capital taxes on income net of depreciation while Carey Rabesona calculate tax rates for both net and gross capital income

tax revenue. The average tax rate on capital income is then measured as

$$\tau^k = \frac{HHT_C + CT + \mu TPI}{\theta(GDP - (TPI - Sub)) - GOVOS} \quad (14)$$

4 Data and results

Tax rates reported in this section are calculated from 1950-2003. The sources for data on expenditures, income and tax revenues are OECD national account statistics. In section 3, table 1 displays the values calculated from national account statistics that are used to compute tax rates 1992-2003 when national accounts are reported according to the 1993 SNA accounting convention. A single series that is reported by the same accounting convention is not available for the period 1950-2003. Table 5 repeats the information in table 1 and includes national account entries from three other publications reported according to different accounting conventions over the period 1950-1992.

If accounting conventions were consistent across time, the values in the left column of table 5 could be interpreted as a single series. However, accounting conventions change several times over the period 1950-2003. If this issue is ignored and tax rates calculated with no adjustment, then changes in the values due to changes in accounting conventions would be misinterpreted as fluctuations in tax rates. To mitigate this problem, values are calculated for a year of overlap each time accounting conventions change. If there is a difference in the values used to compute tax rates in overlapping years, I scale all of the values for years predating the change so that the values in the year of overlap are identical. This preserves the trend of the series of tax rates. It also ensures that fluctuations can be correctly interpreted as changes in tax revenue relative to expenditure or income and not changes in accounting conventions. Since the tax rates are adjusted to be consistent with the latest accounting conventions, updating the tax series in future years should yield estimates comparable to

those presented in this paper.

4.1 Results

Figure 2 shows the tax rates on labor income, capital income, consumption and investment for each country from 1950-2003. Tables with the same information are located in the appendix.

Table 5: National account data 1950-2003

	1950-1963	1963-1980	1980-1992	1992-2003
Value	Gross Domestic Product	Gross Domestic Product	Gross Domestic Product	Gross Domestic Product
<i>GDP</i>	Indirect taxes	Indirect taxes	Indirect taxes	Taxes on production and imports
<i>TPI</i>	Subsidies	Subsidies	Subsidies	Subsidies
<i>Sub</i>	Compensation of employees	Compensation of employees	Compensation of employees	Compensation of employees
<i>W</i>	$GDP - (IT - Sub) - W$	Operating surplus + consumption of fixed capital	Operating surplus + consumption of fixed capital	Gross operating surplus and mixed income
<i>OS</i>	Income of independent traders + depreciation of private unincorporated enterprises	Entrepreneurial income of private unincorporated enterprises + (hh) Consumption of fixed capital	Operating surplus of private unincorporated enterprises + (hh) Consumption of fixed capital	(hh) Gross operating surplus and mixed income
<i>OSPUE</i>	(gov) Income property and entrepreneurship + (gov) Depreciation	(gov) Operating surplus + (gov) Consumption of fixed capital	(gov) Operating surplus + (gov) Consumption of fixed capital	(gov) Operating surplus, net + Consumption of fixed capital
<i>OSGOV</i>	$OS - OSPUE - OSGOV$	$OS - OSPUE - OSGOV$	$OS - OSPUE - OSGOV$	(corp) Operating surplus, gross
<i>OSCORP</i>	Consumer's expenditure	Private final consumption expenditure	Private final consumption expenditure	Household final consumption expenditure
<i>C</i>	Gross domestic asset formation - (gov) gross fixed asset formation - (gov) changes in stocks	Gross fixed capital formation + Increases in stocks - (gov) Gross fixed capital formation - (gov) increases in stocks	Gross fixed capital formation + Increases in stocks - (gov) Gross fixed capital formation - (gov) increases in stocks	Gross capital formation - (gov) Gross capital formation
<i>I</i>	Depreciation and other operating provisions	Consumption of fixed capital	Consumption of fixed capital	Consumption of fixed capital
<i>Dep</i>	(hh) Other direct taxes	(hh) Direct taxes on income	(hh) Direct taxes	(hh) Taxes on income and profits
<i>HHT</i>	(hh) Total contributions to social security	(hh) Social security contributions	(hh) Social security contributions	(gov) Actual Social contributions, receivable
<i>SS</i>	Direct taxes on corporations	(gov) Direct taxes - <i>HT</i>	(gov) Direct taxes - <i>HT</i>	(corp) Current taxes on income and wealth, payable
<i>CT</i>				

5 Comparison with Mendoza, et al

Mendoza et al. (1994) were the first to use aggregate tax revenues and national account statistics to calculate average tax rates. Their source for tax revenues is the *OECD Revenue Statistics*. For data on income and expenditures, Mendoza et al. use national account statistics published by the OECD. They calculate average tax rates on total household income, labor income, capital income and consumption expenditures. No tax rate is calculated on investment expenditures. The key differences in tax rates calculated in this paper and those calculated by Mendoza et al. result from definitions of income and expenditures and treatment of property taxes rather than the source for tax revenues. The following paragraphs detail the method used by Mendoza et al. with comparisons to the method described in section 3. Figure 3 shows plots of tax rates calculated for the USA for this paper with those calculated by Mendoza et al ⁵.

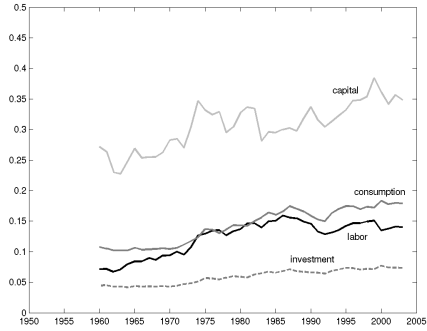
5.1 Labor Income tax

Tax rates on labor income are calculated by computing tax revenues published in revenue statistics (entry labels shown in parenthesis) and defining labor income from national accounts. As mentioned in section 3, Mendoza et al. assume all household income is taxed at the same rate. Household income is defined as the sum of wages and salaries, operating surplus of private unincorporated enterprises, and property income of households. Household income tax revenue is identified as taxes on income, profits and capital gains of individuals (1100). The tax rate on household income is found by dividing tax revenue by total income.

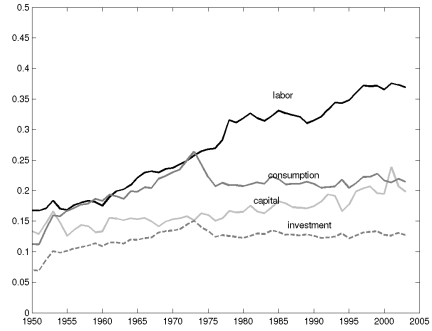
Labor income is defined as wages and salaries from national accounts plus employers contribution to social security (2200) from revenue statistics. Labor income tax revenue is the sum of income taxes paid on labor income, social security contributions (2000) and payroll

⁵For tax rate comparisons of other countries, see www.caramcdaniel.com/researchpapers

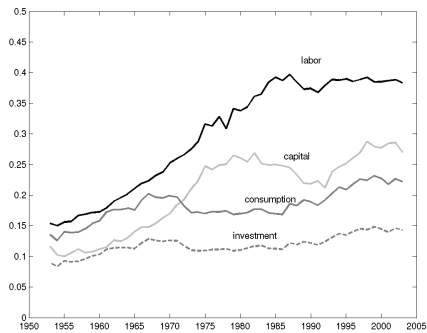
Figure 2: Average tax rates



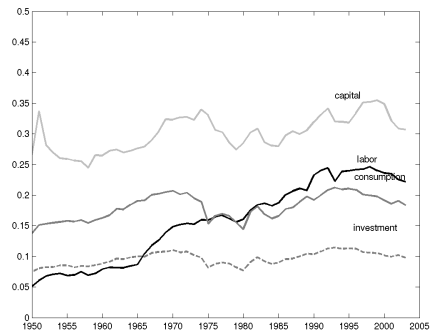
(a) Australia



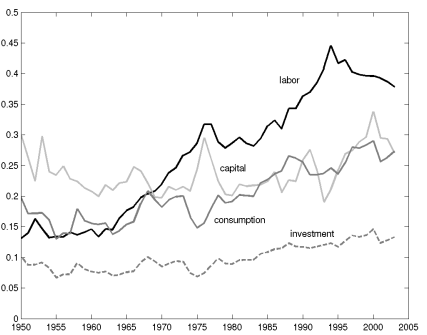
(b) Austria



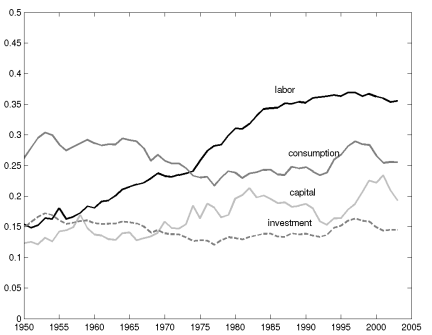
(c) Belgium



(d) Canada

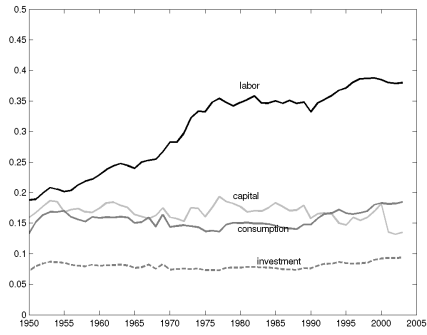


(e) Finland

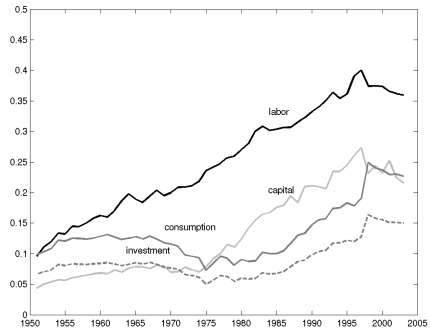


(f) France

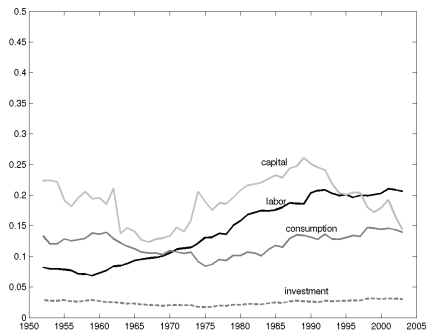
Figure 2: Average tax rates (cont.)



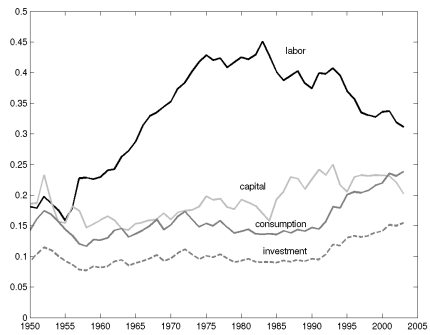
(g) Germany



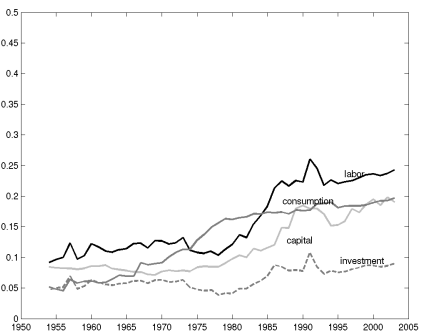
(h) Italy



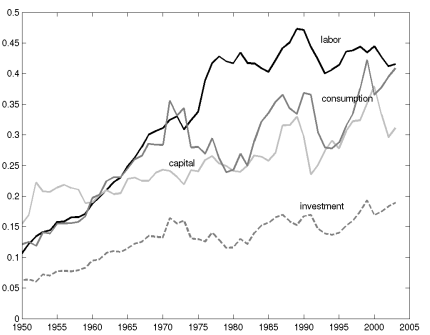
(i) Japan



(j) Netherlands

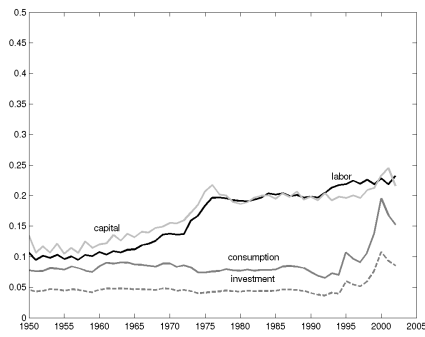


(k) Spain

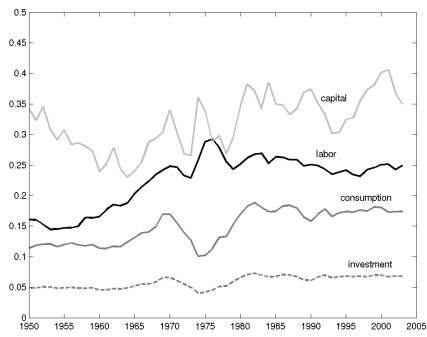


(l) Sweden

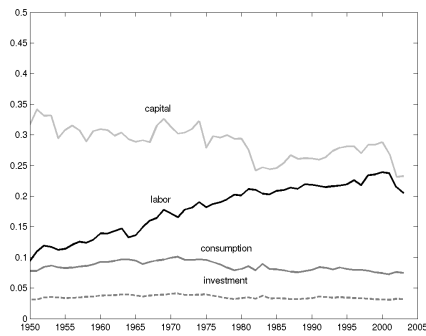
Figure 2: Average tax rates (cont.)



(m) Switzerland



(n) United Kingdom



(o) United States

taxes (3000). The average tax on labor income is found by dividing labor tax revenue by labor income of the household. The labor income tax rate is found by dividing labor income tax revenue by labor income.

Labor income tax revenue as calculated by Mendoza et al. and that calculated in section 3.1 are similar. Household income tax revenue (1100) from the revenue statistics and direct taxes on households *HHT* have the same interpretation. Social security contributions (2000) and payroll taxes (3000) from the revenue statistics are included in the entry for social security contributions, *SS*, in the national accounts. The difference in the tax rates come from the definition of labor income. The national account entry wages and salaries used by Mendoza et al. is only a portion of total labor income as defined in section 3.1. Labor income from section 3.1 includes wages and salaries, a share of income earned by the self-employed, and any compensation employees receive not explicitly considered wages and salaries. Employer contributions to social security are part of compensation not wages and salaries and are included by Mendoza et al. Other compensation includes health insurance, stock options etc. and are a hefty portion of total compensation in countries like the United States. In countries where other compensation is small and income from self-employed is also small, there is little difference between the Mendoza et al. labor tax rates and those calculated in this paper.

5.2 Capital income tax

The average tax rate on capital income is calculated in a similar to manner to that on labor income. Economy-wide capital income is defined as net operating surplus of the whole economy. Household capital income is all net operating surplus of private unincorporated enterprises and property income earned by the household. Capital tax revenue is the sum of income taxes paid by the household on capital income, property taxes paid by both households and businesses (4100), taxes on income, profits and capital gains of corporations

(1200) and taxes on financial and capital transactions (4400). The capital income tax rate is calculated by dividing capital income tax revenue by economy-wide capital income.

The capital income tax rates calculated by Mendoza et al. are calculated using capital income net of depreciation. The value listed in national accounts for depreciation varies from 25% to 70% of total capital income depending on the year and the country chosen. Mendoza et al. consider the entire operating surplus of unincorporated enterprises to be capital income. The share of *OSPUE* attributed to labor as described in section 3.1 is about 25-30% capital income. Capital tax revenue defined by Mendoza et al. and that defined in section 3.3 differs only significantly by treatment of property taxes. Assigning a portion of property tax revenues to consumption tax revenue is relevant only in Canada, Japan, the United Kingdom and the United States⁶. Property taxes paid by households accounts for about 40% of property tax revenue in all four countries. Considering this tax revenue as a tax on consumption has a significant influence on the capital tax rate. The next paragraph describes the method employed by Mendoza et al. to calculate the tax rate on consumption expenditures.

5.3 Consumption tax

Consumption tax revenue is defined as general taxes on goods and services (5110) and excise taxes (5121). Consumption expenditures are private consumption expenditures plus government expenditures less wages paid to government employees calculated from national accounts. Since expenditures are reported gross of taxes, taxable consumption expenditures are defined as consumption expenditures less consumption tax revenue. The consumption tax rate calculation described in section 3.2 allows for some of the indirect tax revenues to be shifted to investment expenditures. The maximum share shifted in any year is less than 20%. Differences in consumption tax rates are driven by inclusion of government expenditures by

⁶Property taxes in Australia are listed as only paid by other entities

Mendoza et al. and inclusion of property taxes paid by households as described in section 3.2. These differences cause significant level differences in the tax rates, but the trends remain similar.

The primary advantage of using the national account statistics to compute tax rates for this paper is the availability of the data. Revenue statistics published by the OECD are only available as early as 1965, and in the case of countries like Italy and France, tax rates using revenue statistics cannot be calculated until after 1970. Using national account data, tax rates are calculated for this paper as early as 1950. This method requires only a basic level of detail for national accounts and can be applied to earlier years and non-OECD countries as well. An additional advantage is that all tax revenue collected by the government is assigned to labor, capital, consumption or investment.

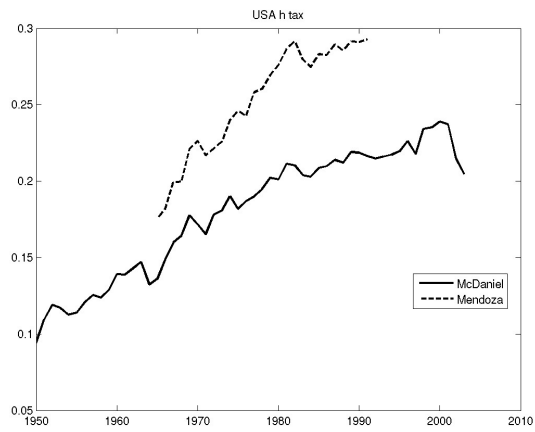
6 Comparison with marginal tax rates

Income tax rates calculated by Mendoza et al. and myself are based on aggregate tax revenues and national account data for income. Joines (1981), Barro and Sahasakul (1986) and Seater (1985) calculate average marginal labor income tax rates for the United States utilizing *Statistics of Income* published by the Internal Revenue Service. McGrattan et al. (1997) update Joines' series MPL1 to 1992. The data used in the previously mentioned papers allow the authors to classify income taxes paid by adjusted gross income and therefore calculate marginal tax rates. While labor tax rates calculated for this paper are average as opposed to marginal, it is of interest to compare their series with those calculated for this paper. Figure 4 shows the average tax on labor income series shown in section 4.1 for the United States with average marginal tax rates on labor income calculated by Barro Sahasakul, Joines⁷, Seater⁸ and McGrattan et al. Table 6 displays the absolute changes in

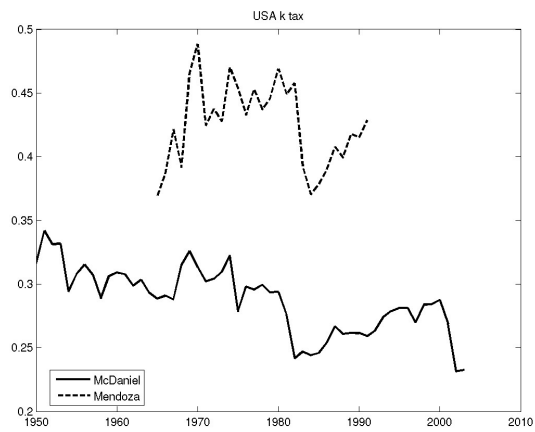
⁷Series MPL1

⁸Series AMTRMPL

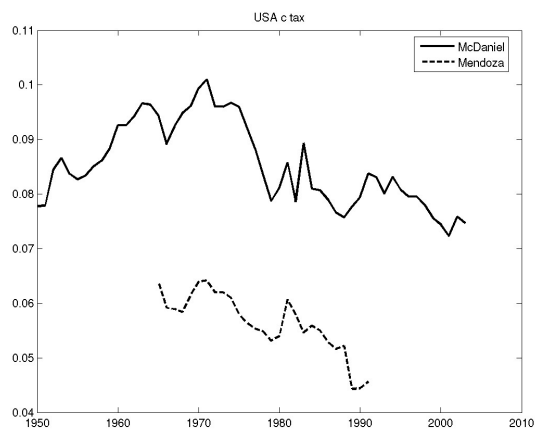
Figure 3: Tax rate comparison



(a) Labor income tax rate



(b) Capital income tax rate



(c) Consumption tax rate

Figure 4: USA Labor Tax Rates Comparison

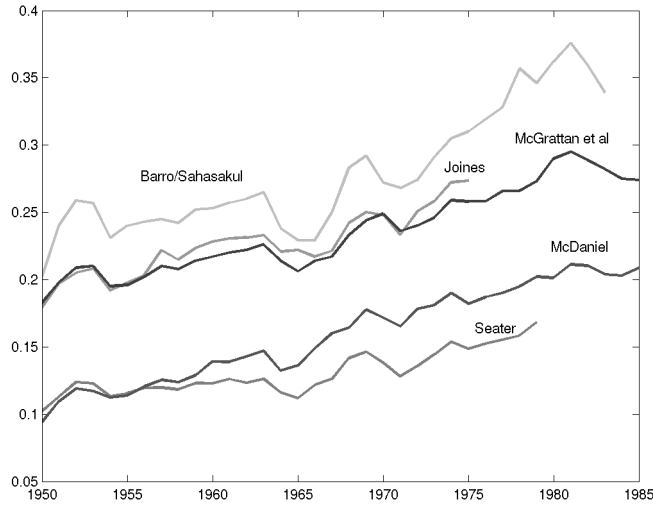


Table 6: Change in labor tax rates

	1950-1960	1960-1970	1970-1980	1950-1980
Barro/Sahasakul	0.051	0.019	0.090	0.160
Joines	0.049	0.020	NA	NA
McDaniel	0.045	0.033	0.029	0.107
McGrattan et al	0.034	0.032	0.041	0.107
Seater	0.021	0.015	0.030	0.066

tax rates over ten year periods. As shown in figure 4 and table 6 the average tax rates for this paper display trends similar to average marginal tax rates.

7 Conclusion

The method described in the previous section produces average tax rates relevant for use in the context of the the neo-classical growth model. Because the method described relies primarily on national account statistics, tax rates calculated begin in 1950. Although taxes are calculated for only OECD countries, this method can be used to calculate average tax rates in other years or for other countries given the proper national account publications.

The primary issues concerning the tax rate calculations in this paper are the following: tax rates are average as opposed to marginal, taxes are calculated gross of depreciation, and other publications are consulted to properly compute consumption tax and investment tax revenue. In section 6, average labor tax rates calculated for this paper are compared with average marginal tax rates on labor income calculated for the United States. In a neo-classical representative agent model, tax series with similar trends will generate similar changes in macroeconomic aggregates.

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Data Notes

A Data Notes

For countries France, United Kingdom and United States, tax rates are exactly as described
in the paper.

Australia

The series for Australia does not begin until 1960. Tax series are calculated for Australia for
periods 1960-1977, 1977-1981, 1981-1992 and 1992-2003 from OECD (1979), OECD (1983),
OECD (1995) and OECD (2005a).

Austria

Tax series for Austria are calculated in periods 1950-1964, 1964-1980, 1980-1992, 1992-1995, and 1995-2003 from OECD (1970), OECD (1982), OECD (1994), OECD (1997) and OECD (2005a). The household accounts for Austria for the period 1950-1995 do not separately report Operating surplus of private unincorporated enterprises and property and entrepreneurial income. Without a field for OSPUE, θ cannot be calculated as described by equation 3. Since θ should be roughly constant over the period, the value for θ 1950-1995 is set to the average value of θ calculated for Austria 1995-2003. No changes in stock for government is reported until 1995. Changes in stocks are assumed to be included in government asset formation 1950-1995.

Belgium

No national account data are available for Belgium prior to 1953. Tax series are calculated 1953-1963, 1963-1980, 1980-1992 and 1992 - 2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a). OSPUE is reported net 1953-1963 and 1963-1980. No value is reported for household depreciation or capital consumption allowance for that period. From 1980-2003 as reported in OECD (1994) and OECD (2005a), household capital consumption is a relatively constant fraction of total capital consumption reported. I assume that from 1953-1980 household capital consumption is the average fraction of total. (CHECK GOV ACCOUNTS FOR INVESTMENT) This allows me to use OSPUE to calculate θ according to (3).

Canada

Tax series for Canada are calculated in periods 1950-1963, 1963-1980, 1980-1992 and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a). OSPUE is reported net 1950-1963 with no value for household depreciation 1950-1963. I find the average share of depreciation 1963-2003 attributed to households as reported in OECD (1982), OECD (1994) and OECD (2005a). I assume that 1950-1963 depreciation for households is equal to the average share of total depreciation in each period. No separation is made in OECD (2005b) between property taxes paid by households and property taxes paid by other entities. As in the United States and the United Kingdom, property taxes are paid by businesses and households with a higher burden placed on businesses. In both the United States and United Kingdom, property taxes paid by other entities represent 58% of total property tax revenue. I assume that property tax revenue in Canada is divided according to the same percentage.

Finland

Tax series for Finland are calculated in periods 1950-1964, 1964-1981, 1981-1992 and 1992-2003 using OECD (1970), OECD (1983), OECD (1995) and OECD (2005a).

France

Tax series for France are calculated in periods 1950-1963, 1963-1980, 1980-1992 and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a).

Germany

Tax series for Germany are calculated in periods 1950-1963, 1963-1980, 1980-1992 and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a). Until 1992, data for tax series are data from West Germany. 1992 on data are for unified Germany. Operating surplus for unincorporated enterprises and household property income are not listed separately until 1992. θ cannot be calculated by (3) for the years 1950-1992. I set θ equal to the average calculated for unified Germany 1992 - 2003.

Italy

Data for Italy are not available in 1950. Tax series for Italy are calculated in periods 1951-1963, 1963-1980, 1980-1991 and 1991-2003 using OECD (1970), OECD (1982), OECD (1994), OECD (2004), and OECD (2005a). Data for Italy stops in 1991 in OECD (1994) and begins in 1992 in OECD (2005a). OECD (2004) has identical numbers for Italy in 1992, so I use that source for data in 1991. Operating surplus for unincorporated enterprises and household property income are not listed separately until 1991. θ cannot be calculated by (3) for the years 1951-1991. I set θ equal to the average calculated for Italy 1991 - 2003.

Japan

Data for Japan are not available until 1952. Tax series for Japan are calculated in periods 1952-1965, 1965-1980, 1980-1992, and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a). No separation is made in OECD (2005b) between property taxes paid by households and property taxes paid by other entities. As in the United States and the United Kingdom, property taxes are paid by businesses and households with a higher burden placed on businesses. In both the United States and United Kingdom, property

taxes paid by other entities represent 58% of total property tax revenue. I make the same assumption for Japan as I did for Canada and assume that property tax revenue in Japan is divided according to the same percentage.

Netherlands

Tax series for the Netherlands are calculated in periods 1950-1968, 1968-1980, 1980-1985, 1985-1992 and 1992-2003 using OECD (1970), OECD (1983), OECD (1988), OECD (1994) and OECD (2005a). It is impossible to calculate θ using (3) until 1985. For years 1950-1985, θ is set as the average value calculated for periods 1985-2003.

Spain

Data for Spain are not available until 1954. Tax series for Spain are calculated in periods 1954-1964, 1964-1980, 1980-1985, 1985-1995 and 1995 - 2003 using OECD (1970), OECD (1983), OECD (1988), OECD (1997), OECD (2005a). It is impossible to calculate θ using (3) until 1980. For years 1950-1980, θ is set as the average value calculated for periods 1980-2003.

Sweden

Tax series for Sweden are calculated in periods 1950-1964, 1964-1981, 1981-1993, and 1993-2003 using OECD (1970), OECD (1983), OECD (1995) and OECD (2005a).

Switzerland

Data for Switzerland are available until 2002. Tax series are calculated are calculated in periods 1950-1963, 1963-1980, 1980-1992 and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a).

United Kingdom

Tax series for the United Kingdom are calculated are calculated in periods 1950-1963, 1963-1980, 1980-1992 and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a).

United States

Tax series for the United States are calculated are calculated in periods 1950-1963, 1963-1980, 1980-1992 and 1992-2003 using OECD (1970), OECD (1982), OECD (1994) and OECD (2005a).

A Tax Rate Tables

Table 7: Average Tax on Labor, τ^h

	AUS	AUT	BEL	CAN	FIN	FRA	DEU	ITA	JPN	NLD	ESP	SWE	CHE	GBR	USA
1950		0.167		0.051	0.131	0.154	0.188			0.181		0.107	0.107	0.161	0.094
1951		0.167		0.060	0.139	0.148	0.189	0.096		0.179		0.122	0.095	0.160	0.110
1952		0.171		0.068	0.163	0.152	0.199	0.111	0.082	0.198		0.134	0.101	0.153	0.119
1953		0.183	0.154	0.071	0.147	0.164	0.208	0.119	0.079	0.187		0.141	0.098	0.145	0.117
1954		0.170	0.150	0.072	0.132	0.162	0.205	0.133	0.079	0.176	0.092	0.144	0.103	0.145	0.112
1955		0.168	0.156	0.069	0.134	0.180	0.202	0.132	0.078	0.159	0.097	0.158	0.096	0.147	0.114
1956		0.176	0.157	0.070	0.133	0.163	0.203	0.145	0.077	0.178	0.100	0.158	0.100	0.147	0.121
1957		0.180	0.167	0.075	0.141	0.166	0.213	0.144	0.071	0.228	0.123	0.165	0.095	0.150	0.125
1958		0.183	0.169	0.069	0.137	0.173	0.218	0.150	0.071	0.228	0.097	0.166	0.103	0.164	0.124
1959		0.181	0.171	0.072	0.141	0.183	0.222	0.158	0.068	0.226	0.103	0.171	0.101	0.164	0.129
1960	0.071	0.175	0.173	0.079	0.146	0.181	0.229	0.162	0.073	0.229	0.122	0.188	0.107	0.166	0.139
1961	0.072	0.189	0.179	0.082	0.134	0.191	0.237	0.160	0.077	0.240	0.117	0.199	0.103	0.177	0.139
1962	0.067	0.199	0.190	0.082	0.146	0.193	0.244	0.171	0.084	0.243	0.110	0.210	0.109	0.185	0.143
1963	0.071	0.202	0.196	0.081	0.145	0.201	0.247	0.186	0.084	0.262	0.109	0.222	0.107	0.183	0.147
1964	0.080	0.209	0.202	0.084	0.165	0.211	0.244	0.198	0.088	0.272	0.113	0.230	0.111	0.188	0.132
1965	0.084	0.221	0.211	0.087	0.176	0.215	0.239	0.189	0.093	0.287	0.114	0.249	0.112	0.203	0.136
1966	0.084	0.229	0.219	0.105	0.183	0.219	0.250	0.184	0.095	0.313	0.123	0.263	0.119	0.214	0.149
1967	0.089	0.232	0.223	0.118	0.197	0.222	0.253	0.194	0.097	0.329	0.123	0.280	0.121	0.223	0.160
1968	0.086	0.230	0.232	0.126	0.204	0.229	0.255	0.204	0.098	0.335	0.115	0.300	0.126	0.234	0.164
1969	0.094	0.235	0.237	0.139	0.208	0.237	0.267	0.195	0.101	0.344	0.127	0.306	0.136	0.242	0.178
1970	0.094	0.237	0.252	0.148	0.220	0.233	0.282	0.200	0.106	0.353	0.127	0.311	0.137	0.248	0.172
1971	0.100	0.243	0.259	0.152	0.238	0.232	0.283	0.208	0.112	0.374	0.122	0.324	0.136	0.247	0.165
1972	0.095	0.249	0.266	0.154	0.246	0.235	0.297	0.209	0.113	0.384	0.124	0.330	0.137	0.233	0.178
1973	0.107	0.257	0.275	0.152	0.266	0.237	0.322	0.211	0.115	0.401	0.132	0.309	0.159	0.229	0.181
1974	0.126	0.264	0.287	0.159	0.272	0.241	0.333	0.218	0.121	0.417	0.111	0.324	0.167	0.257	0.190
1975	0.129	0.268	0.316	0.159	0.287	0.258	0.332	0.236	0.131	0.429	0.108	0.337	0.184	0.288	0.182
1976	0.134	0.269	0.313	0.164	0.317	0.274	0.348	0.242	0.131	0.420	0.106	0.389	0.196	0.292	0.187
1977	0.135	0.282	0.328	0.167	0.317	0.282	0.354	0.247	0.138	0.423	0.110	0.417	0.197	0.279	0.190
1978	0.126	0.315	0.308	0.162	0.288	0.284	0.348	0.257	0.136	0.408	0.103	0.428	0.195	0.256	0.195
1979	0.133	0.311	0.341	0.156	0.279	0.299	0.342	0.259	0.150	0.417	0.113	0.420	0.192	0.243	0.202
1980	0.137	0.318	0.337	0.161	0.287	0.310	0.347	0.270	0.158	0.425	0.121	0.417	0.191	0.251	0.201
1981	0.146	0.326	0.344	0.175	0.296	0.310	0.352	0.280	0.168	0.421	0.137	0.434	0.191	0.261	0.211
1982	0.147	0.318	0.361	0.184	0.286	0.318	0.358	0.300	0.171	0.429	0.132	0.417	0.193	0.268	0.210
1983	0.139	0.314	0.365	0.186	0.282	0.331	0.346	0.308	0.175	0.451	0.154	0.417	0.197	0.269	0.204
1984	0.150	0.322	0.384	0.183	0.294	0.342	0.346	0.302	0.174	0.426	0.168	0.409	0.204	0.252	0.203
1985	0.150	0.331	0.392	0.187	0.314	0.343	0.350	0.303	0.176	0.401	0.184	0.403	0.202	0.263	0.209
1986	0.159	0.327	0.387	0.200	0.324	0.344	0.346	0.306	0.180	0.387	0.213	0.422	0.204	0.263	0.210
1987	0.155	0.323	0.397	0.207	0.310	0.351	0.351	0.307	0.187	0.395	0.225	0.442	0.199	0.259	0.214
1988	0.155	0.321	0.384	0.211	0.343	0.351	0.346	0.315	0.186	0.403	0.216	0.451	0.201	0.259	0.212
1989	0.149	0.310	0.373	0.207	0.343	0.354	0.348	0.323	0.186	0.383	0.225	0.473	0.197	0.248	0.219
1990	0.146	0.314	0.374	0.232	0.363	0.352	0.332	0.332	0.204	0.374	0.223	0.471	0.198	0.250	0.219
1991	0.133	0.321	0.368	0.240	0.370	0.360	0.347	0.340	0.207	0.399	0.261	0.444	0.197	0.249	0.216
1992	0.129	0.332	0.379	0.244	0.385	0.361	0.353	0.351	0.208	0.398	0.246	0.423	0.204	0.243	0.215
1993	0.131	0.344	0.388	0.223	0.409	0.363	0.359	0.364	0.203	0.407	0.217	0.400	0.213	0.235	0.216
1994	0.135	0.343	0.388	0.239	0.446	0.365	0.367	0.354	0.199	0.396	0.226	0.406	0.217	0.238	0.217
1995	0.142	0.348	0.390	0.240	0.417	0.363	0.371	0.361	0.201	0.370	0.220	0.414	0.219	0.242	0.220
1996	0.147	0.360	0.386	0.242	0.422	0.369	0.381	0.390	0.196	0.357	0.223	0.436	0.224	0.234	0.226
1997	0.147	0.372	0.388	0.243	0.402	0.369	0.386	0.400	0.199	0.335	0.225	0.438	0.219	0.231	0.218
1998	0.149	0.371	0.392	0.246	0.398	0.363	0.387	0.374	0.199	0.330	0.230	0.444	0.226	0.242	0.234
1999	0.151	0.372	0.385	0.240	0.396	0.367	0.388	0.375	0.201	0.327	0.235	0.434	0.219	0.246	0.235
2000	0.135	0.365	0.385	0.236	0.396	0.363	0.385	0.374	0.203	0.336	0.236	0.445	0.228	0.251	0.239
2001	0.138	0.375	0.387	0.235	0.393	0.360	0.380	0.365	0.210	0.337	0.234	0.428	0.218	0.251	0.237
2002	0.141	0.373	0.389	0.225	0.387	0.354	0.379	0.362	0.209	0.318	0.237	0.412	0.232	0.242	0.215
2003	0.140	0.369	0.383	0.222	0.378	0.356	0.379	0.360	0.206	0.311	0.243	0.415		0.249	0.205

Table 8: Average Tax on Capital

	AUS	AUT	BEL	CAN	FIN	FRA	DEU	ITA	JPN	NLD	ESP	SWE	CHE	GBR	USA
1950		0.134		0.266	0.301	0.123	0.159			0.186		0.155	0.135	0.342	0.316
1951		0.129		0.337	0.263	0.125	0.167	0.044		0.187		0.169	0.106	0.323	0.342
1952		0.147		0.282	0.225	0.121	0.177	0.050	0.224	0.233		0.222	0.117	0.346	0.331
1953		0.166	0.116	0.269	0.298	0.132	0.187	0.054	0.224	0.190		0.207	0.106	0.309	0.332
1954		0.147	0.102	0.260	0.240	0.126	0.185	0.057	0.221	0.157	0.084	0.207	0.121	0.291	0.294
1955		0.125	0.100	0.259	0.234	0.142	0.168	0.056	0.192	0.155	0.083	0.214	0.105	0.307	0.308
1956		0.136	0.106	0.256	0.249	0.145	0.172	0.060	0.181	0.181	0.082	0.218	0.114	0.284	0.315
1957		0.144	0.112	0.255	0.228	0.149	0.173	0.063	0.195	0.174	0.082	0.213	0.106	0.286	0.307
1958		0.142	0.106	0.245	0.224	0.169	0.168	0.064	0.206	0.147	0.081	0.211	0.125	0.281	0.289
1959		0.132	0.107	0.265	0.213	0.147	0.167	0.067	0.194	0.153	0.082	0.188	0.114	0.273	0.306
1960	0.272	0.133	0.111	0.265	0.208	0.137	0.174	0.068	0.195	0.159	0.086	0.190	0.120	0.239	0.309
1961	0.263	0.155	0.115	0.272	0.199	0.136	0.183	0.067	0.185	0.166	0.086	0.201	0.122	0.252	0.308
1962	0.230	0.154	0.126	0.275	0.218	0.129	0.184	0.073	0.211	0.159	0.087	0.210	0.136	0.278	0.299
1963	0.227	0.151	0.125	0.270	0.209	0.129	0.179	0.070	0.137	0.145	0.081	0.203	0.126	0.243	0.303
1964	0.248	0.154	0.130	0.272	0.221	0.139	0.176	0.076	0.147	0.143	0.080	0.204	0.137	0.230	0.293
1965	0.269	0.153	0.140	0.276	0.224	0.140	0.164	0.079	0.140	0.153	0.079	0.228	0.132	0.240	0.288
1966	0.253	0.155	0.148	0.279	0.248	0.128	0.160	0.078	0.126	0.156	0.076	0.230	0.141	0.255	0.291
1967	0.255	0.149	0.148	0.290	0.241	0.131	0.157	0.076	0.123	0.159	0.076	0.225	0.139	0.287	0.288
1968	0.255	0.141	0.154	0.304	0.221	0.134	0.162	0.081	0.128	0.161	0.072	0.225	0.147	0.294	0.315
1969	0.262	0.149	0.163	0.324	0.198	0.140	0.175	0.079	0.130	0.171	0.071	0.238	0.149	0.303	0.326
1970	0.283	0.153	0.170	0.323	0.197	0.158	0.160	0.070	0.133	0.160	0.077	0.243	0.155	0.340	0.313
1971	0.285	0.154	0.184	0.327	0.215	0.148	0.157	0.070	0.147	0.172	0.079	0.241	0.155	0.302	0.302
1972	0.270	0.158	0.192	0.327	0.210	0.147	0.153	0.078	0.140	0.175	0.077	0.231	0.159	0.268	0.304
1973	0.304	0.151	0.210	0.323	0.215	0.154	0.175	0.074	0.159	0.176	0.078	0.219	0.172	0.265	0.310
1974	0.347	0.163	0.223	0.340	0.208	0.184	0.174	0.070	0.206	0.181	0.077	0.242	0.185	0.360	0.323
1975	0.332	0.160	0.247	0.330	0.243	0.164	0.160	0.079	0.189	0.198	0.084	0.240	0.207	0.339	0.278
1976	0.324	0.150	0.242	0.306	0.295	0.188	0.175	0.091	0.175	0.192	0.085	0.259	0.218	0.288	0.298
1977	0.329	0.154	0.249	0.302	0.260	0.181	0.193	0.100	0.187	0.194	0.085	0.266	0.202	0.299	0.295
1978	0.295	0.167	0.250	0.286	0.224	0.165	0.185	0.115	0.186	0.180	0.084	0.253	0.200	0.268	0.299
1979	0.304	0.164	0.265	0.274	0.203	0.169	0.182	0.111	0.196	0.177	0.090	0.249	0.189	0.296	0.293
1980	0.327	0.165	0.261	0.285	0.201	0.196	0.177	0.124	0.207	0.193	0.098	0.241	0.186	0.344	0.294
1981	0.337	0.175	0.254	0.302	0.219	0.202	0.168	0.141	0.216	0.188	0.103	0.240	0.189	0.382	0.276
1982	0.335	0.165	0.268	0.309	0.216	0.213	0.170	0.155	0.218	0.183	0.100	0.250	0.196	0.372	0.242
1983	0.281	0.163	0.251	0.286	0.218	0.198	0.170	0.164	0.221	0.170	0.114	0.266	0.200	0.342	0.247
1984	0.296	0.172	0.249	0.281	0.219	0.201	0.175	0.167	0.227	0.158	0.111	0.264	0.200	0.385	0.244
1985	0.295	0.182	0.250	0.280	0.224	0.195	0.183	0.176	0.233	0.193	0.116	0.258	0.195	0.350	0.246
1986	0.300	0.179	0.248	0.297	0.239	0.189	0.177	0.179	0.228	0.205	0.121	0.271	0.204	0.348	0.254
1987	0.302	0.173	0.245	0.304	0.206	0.190	0.170	0.194	0.244	0.229	0.149	0.316	0.198	0.333	0.267
1988	0.297	0.172	0.233	0.300	0.226	0.182	0.171	0.183	0.247	0.227	0.148	0.316	0.207	0.342	0.261
1989	0.318	0.171	0.219	0.306	0.224	0.184	0.179	0.210	0.261	0.210	0.180	0.329	0.193	0.369	0.262
1990	0.337	0.174	0.219	0.319	0.259	0.187	0.158	0.211	0.251	0.226	0.185	0.297	0.198	0.375	0.261
1991	0.316	0.182	0.223	0.331	0.276	0.180	0.165	0.210	0.245	0.242	0.180	0.235	0.192	0.351	0.259
1992	0.304	0.194	0.212	0.342	0.243	0.159	0.166	0.206	0.241	0.233	0.180	0.250	0.204	0.333	0.263
1993	0.313	0.191	0.238	0.320	0.190	0.153	0.165	0.234	0.219	0.250	0.170	0.274	0.192	0.302	0.274
1994	0.323	0.166	0.246	0.320	0.211	0.164	0.150	0.235	0.204	0.217	0.152	0.290	0.198	0.303	0.279
1995	0.332	0.177	0.252	0.318	0.242	0.164	0.147	0.245	0.201	0.205	0.153	0.278	0.196	0.324	0.281
1996	0.347	0.199	0.261	0.334	0.269	0.178	0.159	0.260	0.204	0.229	0.159	0.306	0.200	0.327	0.281
1997	0.348	0.203	0.269	0.351	0.274	0.187	0.155	0.273	0.204	0.232	0.179	0.322	0.196	0.354	0.270
1998	0.354	0.207	0.287	0.352	0.288	0.206	0.159	0.231	0.180	0.231	0.173	0.324	0.209	0.373	0.284
1999	0.384	0.195	0.279	0.355	0.296	0.225	0.170	0.244	0.172	0.233	0.187	0.351	0.212	0.381	0.284
2000	0.361	0.195	0.277	0.349	0.338	0.222	0.182	0.232	0.179	0.232	0.195	0.379	0.233	0.401	0.288
2001	0.341	0.239	0.285	0.321	0.295	0.234	0.135	0.252	0.192	0.231	0.185	0.333	0.245	0.406	0.269
2002	0.357	0.207	0.285	0.309	0.293	0.210	0.131	0.224	0.165	0.220	0.198	0.296	0.216	0.367	0.231
2003	0.348	0.198	0.270	0.307	0.271	0.193	0.135	0.216	0.144	0.202	0.190	0.311		0.350	0.232

Table 9: Average Tax on Consumption

	AUS	AUT	BEL	CAN	FIN	FRA	DEU	ITA	JPN	NLD	ESP	SWE	CHE	GBR	USA
1950		0.112		0.138	0.198	0.262	0.133			0.142		0.121	0.078	0.114	0.078
1951		0.112		0.151	0.172	0.279	0.152	0.099		0.161		0.125	0.076	0.118	0.078
1952		0.138		0.153	0.172	0.295	0.163	0.104	0.133	0.174		0.119	0.077	0.120	0.085
1953		0.159	0.136	0.155	0.173	0.304	0.168	0.108	0.120	0.169		0.141	0.081	0.121	0.087
1954		0.158	0.126	0.156	0.161	0.300	0.168	0.122	0.120	0.157	0.051	0.139	0.081	0.116	0.084
1955		0.167	0.140	0.158	0.130	0.284	0.170	0.121	0.128	0.144	0.048	0.155	0.079	0.120	0.083
1956		0.171	0.139	0.157	0.139	0.274	0.159	0.125	0.125	0.134	0.045	0.156	0.084	0.122	0.083
1957		0.177	0.140	0.159	0.139	0.280	0.155	0.125	0.127	0.121	0.064	0.156	0.081	0.119	0.085
1958		0.179	0.145	0.155	0.179	0.286	0.152	0.124	0.130	0.117	0.058	0.158	0.077	0.118	0.086
1959		0.186	0.154	0.159	0.160	0.292	0.160	0.126	0.138	0.127	0.061	0.167	0.075	0.120	0.088
1960	0.107	0.183	0.158	0.163	0.156	0.286	0.158	0.128	0.136	0.127	0.061	0.197	0.084	0.114	0.093
1961	0.105	0.193	0.172	0.167	0.154	0.283	0.160	0.131	0.139	0.130	0.059	0.202	0.090	0.113	0.093
1962	0.102	0.190	0.176	0.178	0.156	0.285	0.159	0.127	0.129	0.143	0.059	0.224	0.089	0.117	0.094
1963	0.102	0.187	0.176	0.177	0.137	0.284	0.160	0.123	0.122	0.145	0.064	0.231	0.090	0.116	0.097
1964	0.102	0.199	0.179	0.184	0.144	0.294	0.159	0.125	0.116	0.132	0.071	0.231	0.090	0.124	0.096
1965	0.106	0.198	0.176	0.190	0.154	0.291	0.150	0.128	0.112	0.137	0.069	0.245	0.087	0.131	0.094
1966	0.103	0.205	0.192	0.191	0.158	0.289	0.151	0.124	0.107	0.142	0.069	0.260	0.087	0.139	0.089
1967	0.104	0.204	0.202	0.200	0.188	0.278	0.159	0.128	0.105	0.150	0.091	0.266	0.085	0.140	0.092
1968	0.104	0.220	0.196	0.202	0.208	0.257	0.144	0.124	0.105	0.160	0.088	0.286	0.083	0.149	0.095
1969	0.105	0.224	0.195	0.205	0.194	0.268	0.164	0.118	0.103	0.143	0.090	0.284	0.089	0.169	0.096
1970	0.104	0.230	0.199	0.207	0.182	0.257	0.144	0.116	0.109	0.151	0.091	0.284	0.089	0.169	0.099
1971	0.106	0.234	0.197	0.201	0.194	0.253	0.145	0.112	0.107	0.165	0.101	0.356	0.083	0.155	0.101
1972	0.111	0.249	0.183	0.204	0.199	0.253	0.147	0.098	0.105	0.173	0.108	0.331	0.086	0.139	0.096
1973	0.117	0.263	0.171	0.195	0.200	0.245	0.145	0.096	0.107	0.161	0.113	0.344	0.082	0.127	0.096
1974	0.123	0.244	0.172	0.189	0.166	0.233	0.143	0.093	0.091	0.148	0.113	0.279	0.074	0.101	0.097
1975	0.137	0.222	0.170	0.153	0.148	0.230	0.136	0.073	0.084	0.154	0.128	0.280	0.074	0.102	0.096
1976	0.136	0.207	0.173	0.166	0.156	0.231	0.137	0.084	0.087	0.150	0.137	0.269	0.076	0.112	0.092
1977	0.130	0.213	0.173	0.169	0.180	0.217	0.136	0.096	0.095	0.158	0.149	0.294	0.077	0.132	0.088
1978	0.136	0.209	0.174	0.166	0.202	0.230	0.147	0.093	0.093	0.147	0.156	0.261	0.079	0.133	0.083
1979	0.143	0.209	0.168	0.156	0.189	0.241	0.150	0.081	0.101	0.138	0.163	0.239	0.078	0.153	0.079
1980	0.143	0.207	0.170	0.144	0.191	0.238	0.150	0.090	0.101	0.141	0.162	0.243	0.077	0.169	0.081
1981	0.142	0.210	0.172	0.173	0.202	0.229	0.151	0.087	0.107	0.144	0.165	0.269	0.079	0.182	0.086
1982	0.149	0.213	0.177	0.182	0.201	0.237	0.149	0.088	0.105	0.137	0.166	0.249	0.077	0.188	0.079
1983	0.156	0.211	0.177	0.168	0.200	0.239	0.149	0.102	0.101	0.136	0.171	0.290	0.078	0.181	0.089
1984	0.164	0.223	0.171	0.162	0.222	0.243	0.148	0.100	0.111	0.137	0.171	0.322	0.078	0.173	0.081
1985	0.160	0.219	0.169	0.166	0.227	0.243	0.145	0.100	0.118	0.136	0.173	0.335	0.079	0.174	0.081
1986	0.165	0.210	0.168	0.177	0.236	0.235	0.142	0.104	0.115	0.142	0.173	0.354	0.084	0.183	0.079
1987	0.174	0.211	0.186	0.180	0.241	0.235	0.141	0.117	0.129	0.138	0.174	0.366	0.084	0.184	0.077
1988	0.170	0.211	0.183	0.189	0.266	0.248	0.140	0.130	0.135	0.144	0.171	0.343	0.083	0.180	0.076
1989	0.166	0.214	0.192	0.198	0.262	0.245	0.148	0.133	0.134	0.141	0.177	0.334	0.081	0.165	0.078
1990	0.159	0.211	0.189	0.192	0.255	0.247	0.148	0.147	0.131	0.147	0.176	0.368	0.075	0.158	0.079
1991	0.153	0.205	0.183	0.200	0.235	0.240	0.158	0.155	0.127	0.145	0.177	0.365	0.069	0.169	0.084
1992	0.150	0.206	0.192	0.208	0.235	0.234	0.165	0.157	0.136	0.157	0.187	0.304	0.065	0.178	0.083
1993	0.163	0.207	0.202	0.212	0.237	0.238	0.166	0.174	0.128	0.181	0.188	0.279	0.073	0.166	0.080
1994	0.170	0.218	0.213	0.209	0.246	0.259	0.172	0.175	0.128	0.179	0.190	0.278	0.070	0.172	0.083
1995	0.174	0.204	0.209	0.211	0.236	0.267	0.166	0.183	0.131	0.201	0.181	0.288	0.107	0.174	0.081
1996	0.174	0.212	0.218	0.209	0.254	0.281	0.165	0.178	0.134	0.205	0.184	0.314	0.097	0.173	0.080
1997	0.169	0.222	0.226	0.201	0.280	0.289	0.167	0.190	0.133	0.204	0.184	0.335	0.091	0.176	0.080
1998	0.173	0.223	0.224	0.199	0.278	0.285	0.170	0.249	0.147	0.207	0.184	0.375	0.107	0.175	0.078
1999	0.172	0.228	0.232	0.198	0.283	0.283	0.180	0.240	0.146	0.215	0.185	0.422	0.138	0.181	0.076
2000	0.183	0.216	0.227	0.191	0.290	0.266	0.183	0.237	0.144	0.219	0.189	0.365	0.195	0.180	0.074
2001	0.178	0.213	0.217	0.186	0.256	0.254	0.181	0.229	0.146	0.235	0.192	0.377	0.168	0.173	0.072
2002	0.180	0.219	0.227	0.191	0.263	0.256	0.182	0.230	0.143	0.231	0.193	0.394	0.153	0.174	0.076
2003	0.179	0.214	0.222	0.183	0.273	0.255	0.184	0.226	0.139	0.238	0.196	0.409		0.174	0.075

Table 10: Average Tax on Investment

	AUS	AUT	BEL	CAN	FIN	FRA	DEU	ITA	JPN	NLD	ESP	SWE	CHE	GBR	USA
1950		0.070		0.075	0.102	0.148	0.071			0.092		0.063	0.045	0.048	0.031
1951		0.069		0.081	0.088	0.157	0.080	0.067		0.104		0.063	0.043	0.049	0.031
1952		0.086		0.082	0.088	0.166	0.084	0.070	0.029	0.115		0.060	0.044	0.051	0.035
1953		0.101	0.090	0.083	0.092	0.172	0.087	0.073	0.027	0.110		0.072	0.047	0.050	0.035
1954		0.098	0.083	0.085	0.083	0.169	0.086	0.082	0.027	0.101	0.047	0.070	0.046	0.048	0.035
1955		0.101	0.093	0.085	0.067	0.161	0.085	0.080	0.029	0.093	0.050	0.078	0.044	0.049	0.033
1956		0.105	0.091	0.082	0.072	0.154	0.082	0.083	0.027	0.087	0.051	0.078	0.046	0.050	0.034
1957		0.107	0.092	0.084	0.073	0.157	0.080	0.083	0.026	0.078	0.069	0.077	0.046	0.048	0.035
1958		0.110	0.096	0.084	0.091	0.159	0.079	0.082	0.028	0.077	0.049	0.079	0.044	0.048	0.036
1959		0.114	0.101	0.086	0.081	0.160	0.082	0.083	0.029	0.084	0.053	0.083	0.042	0.049	0.036
1960	0.044	0.109	0.103	0.088	0.077	0.156	0.080	0.084	0.027	0.082	0.063	0.095	0.046	0.046	0.038
1961	0.045	0.115	0.111	0.091	0.075	0.154	0.081	0.085	0.025	0.084	0.059	0.097	0.048	0.046	0.038
1962	0.043	0.115	0.114	0.096	0.077	0.155	0.081	0.083	0.025	0.092	0.056	0.107	0.047	0.047	0.038
1963	0.043	0.113	0.114	0.095	0.070	0.155	0.082	0.081	0.024	0.094	0.055	0.110	0.048	0.047	0.039
1964	0.042	0.120	0.114	0.098	0.072	0.158	0.081	0.083	0.023	0.085	0.057	0.109	0.048	0.049	0.039
1965	0.044	0.119	0.113	0.100	0.076	0.157	0.077	0.085	0.023	0.089	0.058	0.115	0.046	0.052	0.038
1966	0.043	0.122	0.122	0.100	0.077	0.156	0.078	0.083	0.022	0.092	0.061	0.122	0.047	0.055	0.036
1967	0.043	0.123	0.129	0.106	0.092	0.150	0.082	0.085	0.021	0.096	0.062	0.125	0.046	0.055	0.038
1968	0.043	0.131	0.126	0.107	0.101	0.140	0.075	0.082	0.020	0.102	0.058	0.135	0.045	0.058	0.038
1969	0.043	0.134	0.124	0.108	0.093	0.145	0.083	0.078	0.019	0.092	0.063	0.134	0.048	0.065	0.039
1970	0.043	0.134	0.126	0.110	0.085	0.139	0.074	0.077	0.020	0.097	0.063	0.132	0.048	0.066	0.041
1971	0.044	0.137	0.125	0.106	0.090	0.138	0.075	0.075	0.021	0.105	0.060	0.164	0.044	0.061	0.041
1972	0.047	0.144	0.117	0.108	0.094	0.137	0.075	0.066	0.020	0.111	0.060	0.155	0.045	0.055	0.039
1973	0.048	0.151	0.110	0.102	0.093	0.133	0.075	0.064	0.020	0.103	0.063	0.160	0.044	0.050	0.038
1974	0.051	0.140	0.109	0.098	0.075	0.126	0.075	0.061	0.018	0.096	0.051	0.131	0.040	0.040	0.039
1975	0.057	0.134	0.109	0.082	0.069	0.128	0.073	0.050	0.017	0.101	0.048	0.130	0.041	0.042	0.040
1976	0.056	0.124	0.111	0.088	0.074	0.127	0.073	0.056	0.018	0.099	0.046	0.126	0.043	0.045	0.038
1977	0.054	0.127	0.111	0.090	0.087	0.120	0.073	0.064	0.020	0.103	0.047	0.140	0.043	0.051	0.036
1978	0.057	0.126	0.112	0.088	0.098	0.128	0.077	0.062	0.019	0.097	0.039	0.128	0.044	0.052	0.034
1979	0.060	0.124	0.109	0.082	0.090	0.133	0.077	0.055	0.021	0.091	0.041	0.116	0.043	0.059	0.032
1980	0.059	0.123	0.110	0.077	0.089	0.132	0.077	0.060	0.021	0.093	0.041	0.116	0.043	0.066	0.033
1981	0.058	0.126	0.113	0.090	0.096	0.129	0.078	0.058	0.022	0.096	0.049	0.130	0.044	0.071	0.035
1982	0.063	0.130	0.117	0.098	0.096	0.133	0.078	0.059	0.022	0.091	0.049	0.122	0.043	0.073	0.033
1983	0.065	0.129	0.117	0.092	0.096	0.136	0.078	0.069	0.022	0.091	0.056	0.140	0.044	0.070	0.037
1984	0.067	0.135	0.113	0.088	0.106	0.138	0.077	0.067	0.024	0.091	0.062	0.152	0.044	0.067	0.033
1985	0.066	0.132	0.113	0.090	0.108	0.139	0.076	0.067	0.025	0.090	0.070	0.156	0.044	0.067	0.033
1986	0.068	0.127	0.112	0.096	0.113	0.134	0.074	0.071	0.024	0.093	0.087	0.165	0.046	0.070	0.033
1987	0.071	0.127	0.122	0.096	0.115	0.133	0.074	0.079	0.027	0.091	0.085	0.169	0.046	0.070	0.032
1988	0.068	0.127	0.119	0.100	0.123	0.139	0.073	0.087	0.027	0.094	0.078	0.159	0.045	0.067	0.032
1989	0.067	0.128	0.124	0.104	0.118	0.137	0.076	0.089	0.027	0.092	0.079	0.153	0.044	0.062	0.033
1990	0.066	0.126	0.122	0.103	0.117	0.138	0.076	0.098	0.026	0.096	0.078	0.167	0.040	0.061	0.034
1991	0.065	0.122	0.119	0.108	0.115	0.136	0.080	0.104	0.025	0.095	0.108	0.169	0.038	0.067	0.036
1992	0.064	0.123	0.124	0.113	0.118	0.134	0.083	0.106	0.027	0.103	0.085	0.147	0.036	0.070	0.035
1993	0.069	0.125	0.131	0.115	0.120	0.136	0.084	0.117	0.027	0.119	0.073	0.139	0.041	0.066	0.034
1994	0.071	0.130	0.137	0.112	0.123	0.148	0.086	0.118	0.027	0.118	0.078	0.137	0.039	0.067	0.035
1995	0.073	0.122	0.135	0.113	0.117	0.152	0.084	0.122	0.028	0.130	0.076	0.140	0.060	0.068	0.034
1996	0.073	0.127	0.141	0.112	0.126	0.160	0.084	0.119	0.028	0.133	0.077	0.151	0.054	0.067	0.033
1997	0.071	0.131	0.145	0.107	0.136	0.163	0.084	0.127	0.028	0.132	0.081	0.160	0.051	0.068	0.033
1998	0.072	0.132	0.144	0.106	0.133	0.160	0.085	0.164	0.031	0.134	0.083	0.175	0.060	0.067	0.033
1999	0.071	0.134	0.148	0.105	0.136	0.159	0.090	0.158	0.031	0.139	0.087	0.193	0.077	0.070	0.032
2000	0.077	0.127	0.145	0.102	0.146	0.149	0.092	0.155	0.030	0.141	0.087	0.169	0.108	0.070	0.031
2001	0.074	0.126	0.140	0.100	0.123	0.143	0.093	0.151	0.031	0.151	0.085	0.175	0.093	0.067	0.031
2002	0.074	0.131	0.146	0.102	0.128	0.145	0.093	0.151	0.031	0.150	0.086	0.183	0.085	0.068	0.032
2003	0.073	0.127	0.143	0.098	0.133	0.145	0.094	0.150	0.030	0.155	0.089	0.189	0.085	0.068	0.032