Economics Bulletin

Volume 36, Issue 3

Growth, income inequality, and capital income taxes: evidence from a seemingly unrelated regression model on panel data

Chih-Wen Mao
Department of Public Finance and Tax Administration, National Taipei University of Business.

Abstract

It is commonly believed that taxes on capital income are harmful to economic growth but beneficial for decreasing income inequality. This study constructs two equations, a growth equation and an income inequality equation, to empirically examine the actual impact of capital income taxes on growth and income inequality. We employ the seemingly unrelated regressions with fixed effects panel data model and instrumental variable estimation technique. The research sample includes data from OECD countries for the period 1990 to 2013. The empirical results show that capital income taxes exhibit a negative influence on both economic growth and income inequality. Our findings suggest that although capital income taxes hinder economic growth, they achieve the purpose of income redistribution.

Citation: Chih-Wen Mao, (2016) "Growth, income inequality, and capital income taxes: evidence from a seemingly unrelated regression model on panel data", *Economics Bulletin*, Volume 36, Issue 3, pages 1463-1478
Contact: Chih-Wen Mao - chihwen@ntub.edu.tw.
Submitted: March 20, 2016. **Published:** August 03, 2016.

1. Introduction

In the last two decades, many countries have suffered from slow economic growth and problems related to high levels of income inequality. Governments worldwide have sought to solve these problems by tax system reform. Based on conventional wisdom, to stimulate growth, capital income taxes must decrease (Uhlig and Yanangawa, 1996). The reason is that a decrease in capital income taxes increases private returns to capital, resulting in higher savings and investment and, consequently, faster growth. Therefore, many countries that adopt tax cuts policy consider only factors related to efficiency, but ignore considerations of fairness. For example, a cut in corporate income tax would reduce the tax burden of capital owners (i.e., shareholders), but would not reduce the tax burden on people who do not own capital. Although such tax cuts serve as viable incentives for investments, leading to economic growth, they have the effect of contributing to income inequality. The purpose of this paper is to examine the effect of capital income taxes on growth and income inequality.

The first consideration in this study is the relationship between growth and capital income taxes, which has been debated for decades by economists. Many influential papers have suggested that capital income taxes are bad for growth [e.g., Judd (1985); Sinn (1985); Chamley (1986); Lucas (1990); Feldstein (1995)]. Several later empirical papers [e.g., Lee and Gordon (2005), Arnold (2008), and Dackehag and Hansson (2012)] specifically examine the association between a capital income tax on corporate and economic growth. They conclude that raising the statutory corporate income tax rate is harmful to economic growth. However, one strand of the literature [e.g., Uhlig and Yanangawa (1996), Gruner and Heer (2000), and Kunze and Schuppert (2010)] suggests that the capital income tax may have a positive effect on economic growth because it has a positive effect on labor decisions. For example, Uhlig and Yanangawa (1996) state that since capital income taxes accrue to the capitalist, taxing capital income alleviates the tax burden on laborers and leaves them with more income to save. If savings from both the capitalists and the laborers are sufficiently inelastic with respect to interest rates, the net effect on savings is positive, and therefore results in higher growth. Gruner and Heer (2000) argue that the capital income tax increases the opportunity cost of leisure and hence raises both the human capital investment and employment of laborers. As a result, the economic growth rate rises.

The second consideration in this study is the relationship between income inequality and capital income taxes. Poterba (2007) emphasizes that the tax system plays a central role in income inequality, because it has both direct and indirect effects on income distribution. The direct effect derives from tax collection. When some people pay more tax than others, the after-tax income distribution is different. The indirect effect arises from changes in taxpayer behavior that are induced by the tax system and from the resulting changes in pre-tax income distribution. Lambert and Thoresen (2012) determine that the tax system of Norway, which imposes a lower tax rate on capital income compared to that of labor income, increases inequality. Plümper and Troeger (2012) reveale that tax

competition causes governments to shift the tax burden from capital to labor, thereby increasing income inequality.

This study constructs two equations, a growth equation and an income inequality equation, each of which includes capital income tax rates as the explanatory variable to determine how capital income taxes influence growth and income inequality. Because these two factors are both determined by capital income taxes and other determinants, these two equations are likely to be related by their error terms. When the error terms are linked across the equations, they can be more effectively estimated together than when other methods are employed to estimate each of them separately. Thus, we use a system-wise regression model to estimate these two equations jointly. The seemingly unrelated regressions model with error components (hereafter panel SUR), which combines the seemingly unrelated regressions model proposed by Zellner (1962) with the panel data application, is adopted to analyze the effect of capital income taxes on growth and inequality.

Another major econometric concern that requires attention is the possible endogeneity of capital income taxes. Capital income taxes are generally set according to a country's culture, political, and economic development stage. Thus, it is an endogeneity setting. An instrumental variable estimation technique is desirable and widely used.[1] As a result, this study uses the first lags of each income tax rate as the instrumental variables to deal with the endogeneity problem.

This paper is the first study to investigate the effect of capital income taxation on economic growth and income inequality with the panel SUR model. We employ panel data covering thirty OECD countries from 1990 to 2013 to empirically examine this issue. Intuitively, taxing capital owners has the effect of redistributing wealth to people who do not own capital. Furthermore, according to a literature review, previous studies have evidenced positive influence of capital income tax on economic growth, despite the conventional thought to the contrary. If this positive influence is established, capital income tax would promote both economic growth and income redistribution. However, according to the empirical findings of this study, capital income tax reduces income inequality but undermines economic growth. In the next section, we describe the empirical model. Data and basic statistics are reported in section 3. Empirical results are presents in section 4. Section 5 discusses tests of the robustness of empirical results. Concluding remarks are put in the last section.

2. Empirical Model

This paper constructs two equations to clarify the consequences of capital income taxes on growth and income inequality. The empirical model is specified as follows:

$$growth_{it} = \beta_0 + \beta_1' x_{it} + e_{it} \quad (1)$$

$$inequality_{it} = \alpha_0 + \alpha_1' z_{it} + \varepsilon_{it} \quad (2)$$

[1] For example, Mendoza et al. (1997), Lee and Gordon (2005) and Dackehag and Hansson (2012). These authors use the instrumental variable technique in their studies.

$$x_{it} = [tk_{it}, invest_{it}, infla_{it}, gcons_{it}, school_{it}, open_{it}, gdpper90_i]'$$

$$z_{it} = [tk_{it}, invest_{it}, infla_{it}, gcons_{it}, school_{it}, open_{it}, agedep_{it}]'$$

where subscripts $i = 1,..., N$ and $t = 1,..., T$ denote the *i*th country at time *t*; e_{it} and ε_{it} represent error terms with $E(e_{it}) = 0$ and $E(\varepsilon_{it}) = 0$. (1) and (2) represent a system of equations that comprise the growth and inequality equations, in which the growth rate of real GDP per capita (*growth*) and income inequality (*inequality*) are the dependent variables. The Gini index (*gini*) is used to measure the income inequality.[2] The effective capital income tax rate (*tk*)[3] is the explanatory variable employed in this study, and the method proposed by Mendoza et al. (1994)[4] is adopted for its calculation. In addition, we use an instrumental variable approach. We follow Mendoza et al. (1997) and use the lagged value of the capita income tax rate as instruments. The variables x_{it} and z_{it} are vectors of independent variables, which are introduced as follows.

Following Barro (1991), King and Levine (1993), and Levine et al. (2000), we adopt four major macroeconomic environment variables as the control variables. These comprise the gross fixed capital formation (*invest*), inflation (*infla*), government consumption (*gcons*), and the logarithm of real GDP per capita in 1990 (*gdpper90*). The years of completed schooling for persons aged 15 and over (*school*) are added as one of the control variables to represent the level of human capital (Barro, 2001). The degree of openness (*open*) is the sum of imports and exports of goods and services to GDP. It not only reflects a country's openness to trade, but also measures the economy's dependence on the international market (Barro, 2001; Dollar and Kraay, 2004). Based on the convergence hypothesis, national development speed varies because of initial income; therefore, we adopt the logarithm of real GDP per capita in 1990 (*gdpper90*) to represent the initial income. Finally, income inequality commonly depends on the distribution of household income per capita. We use the age dependency ratio[5] (*agedep*) to capture this dimension (Cornia 2012).

Equations (1) and (2) are a group of related equations. The residuals of these two regressions are likely to be highly correlated. Therefore, an OLS model is unable to meet the requirements of the best linear unbiased estimates, primarily because the variance is not at a minimum. Thus, the use of the SUR model can reduce heterogeneity and the contemporaneous correlation of residuals. In addition, the parameters obtained from the SUR model converge to the maximum likelihood

---

[2] The Gini index is the Gini coefficient expressed simply as a percentage, that is, multiplied by 100. The Gini coefficient measures income inequality through values of a frequency distribution of income. The Gini coefficient produces a range from a minimum value of zero, expressing perfect equality, to a maximum value of one, expressing maximal inequality.

[3] The effective capital income tax rate and the statuary corporate income tax rate are different. The total capital income used in calculating the effective capital income tax rate includes both corporate capital income and individual capital income. However, the statuary corporate income tax rate established by the government only applies to the corporate income.

[4] This method first identifies revenue raised by capital income taxes and defines the corresponding tax bases, then produces estimates of effective tax rates. See Mendoza et al. (1994) for the details.

[5] Age dependency ratio is the ratio of dependents (people younger than 15 or older than 64) to the working-age population (those ages 15-64).

parameter estimates, and can exhibit unbiased and efficiency. More importantly, because the research sample employed in this study is comprised of panel data, the panel data regression model that captures the unobserved individual specific effect is appropriate. Therefore, the multiple-equation panel data procedure that combines the SUR and the panel data regression model is adopted for the measurement method. In addition, the fixed effects approach of the panel model, as opposed to the random effects approach, is used in this study. The reason is that the fixed effects framework is more reasonable when we focus on a specific set of countries rather than randomly selecting countries (Baltagi, 2008, p. 14-21).

It is important to determine whether the estimated correlation between equations is statistically significant. The hypothesis of no correlation versus existing correlation in alternative can be examined by the following hypothesis.

$$H_0 : \sigma_{12} = 0$$

where σ_{12} is the covariance between the equations.

The Lagrange multiplier statistic suggested by Breusch and Pagan (1980) of testing H_0 is

$$\lambda_{LM} = NT\gamma_{12}^2$$

where $\gamma_{12}^2 = \sigma_{12}^2 / \sigma_1 \sigma_2$ is the squared correlation.

3. Data

The sampling period of this study is from 1990 to 2013, and 30 OECD countries possessing complete data are investigated.[6] The data for calculating the effective capital income tax rate are obtained from the database compiled by the OECD. Data on the economic growth rate, investment, inflation, government consumption, age dependency ratio and the initial income are derived from the World Development Indicators (WDI) database issued by the World Bank. The Gini index is extracted from the UNU-WIDER World Income Inequality Database. The data for the years of completed schooling by persons aged 15 and over are obtained from the human capital files organized by Barro and Lee (2010). The classification, name, description, and data sources of the variables used in this study are presented in Table 1.

Table 2 shows the variable averages categorized for each investigated country. The growth rate for each country is shown in the first column. It should be noted that the majority of OECD countries possess highly developed economies and, therefore, the differences in economic growth rates between them are not considerable. The country exhibiting the highest growth rate is Estonia

[6] Four OECD countries (Iceland, Israel, New Zealand and Turkey) are excluded from our samples because of incomplete data.

(5.07%), followed by Korea (4.68%) and Chile (3.95%). The countries exhibiting the lowest growth rates are Italy (0.64%), Switzerland (0.82%), and Greece (0.83%). The Gini index is listed in the second column. Chile (54.36%), Mexico (52.48%), and United States (40.70%) are countries possessing the largest income inequality; whereas the Slovak Republic (24.05%), Denmark (24.70%), and Czech Republic (24.89%) are countries with the smallest income inequality. In the third column, the country with the highest capital income tax rate is Canada (96.80%), followed by Sweden (88.60%), then United Kingdom (83.33%). The country with the lowest capital income tax rate is Mexico (14.83%), followed by Slovenia (19.82%), then Greece (19.95%).[7] The gap between the highest and lowest capital income tax rates is approximately 5-fold, indicating considerable differences in capital income tax policies among the countries.

Figure 1 shows the average capital income tax rate, average growth rate, and average income inequality over time in various countries. This figure shows a downward trend for capital income tax rate and growth over time, whereas changes in income inequality appear as nonsignificant within the given sample period. Figure 2 is a scatter plot for capital income tax rate and growth rate in various countries in 2006. In general, a higher capital income tax rate is accompanied by lower growth, showing a negative correlation between the two. Figure 3 is a scatter plot for capital income tax rate and income inequality in various countries in 2006, suggesting a positive correlation between the two factors.

4. Empirical Results

The panel SUR estimation with instrumental variables is adopted in this study. Table 3 presents the correlation between the growth and inequality equations, and the results of the Breush and Pagan test. The correlation between these two equations is positive and about 0.12. The Breush and Pagan test is employed to examine whether the estimated correlation between equations is statistically significant. With the panel SUR model, the calculated χ^2 value is equal to 6.032 (resulting in a p value of 0.014) and suggests a rejection of H_0 at the significant levels of 0.05. This means that the residuals of the growth and inequality equations are significantly correlated. Therefore, it is appropriate to use SUR estimation method.

The results from the panel SUR estimation of the growth and inequality equations are shown in Table 4. Columns (1) and (2) present the empirical results of the growth equation and the inequality equation from panel SUR, respectively. The coefficient of the effective capital income tax rate is significantly negative in both equations, and the value is approximately -.033 in the growth equation and -.051 in the inequality equation. In other words, capital income taxes can affect growth negatively, but can decrease the degree of income inequality.

Two major findings can be derived from this study. First, our results indicate that capital income

[7] We eliminate 52 observations with the effective capital income tax rates higher than 100% in order to maintain the data reasonability.

taxes possess a strong negative effect on economic performance. This empirically confirms the results of Lucas (1990), Feldstein (1995), and Lee and Gordon (2005), who contend that capital income taxes reduce growth. However, this study contradicts the results of Uhlig and Yanangawa (1996), Gruner and Heer (2000), and Kunze and Schuppert (2010), who claim that taxing capital income enhances economic performance.

Second, this study provides empirical evidence that capital income tax rates can decrease income inequality. In other words, higher capital income tax rates can improve income distribution fairness. Our findings are consistent with previous studies, such as Lambert and Thoresen (2012), and Plümper and Troeger (2012), which suggest that low capital income taxes worsen income distribution fairness.

Below, the estimated coefficients of other control variables displayed in Table 4 are explained. In Column (1), we find that the estimated growth effects of the major macroeconomic variables in our specification match the projections in the previous growth literature. The anticipated coefficient *invest* is positive in the growth equation. The reason is that investments in fixed assets can increase production, then stimulate growth. Barro (1995) suggests that businesses and households perform poorly when inflation is high, so that the estimated coefficients of the inflation rate are negative, implying that inflation is harmful to the economy. Our estimated coefficient is consistent with the argument put forward by Barro (1995). We project that the trade openness can enhance growth, and our estimated results show that the coefficient of *open* is significantly positive. According to the convergence hypothesis, the higher the initial income, the lower is economic growth. The coefficient of *gdpper90* is significantly negative, which indicates that the convergence hypothesis is supported in this study.

In the inequality equation, the coefficient of *gcons* is significantly positive, meaning that the greater the size of the government, the worse is the income redistribution function. This result shows that the government's income redistribution policy results in the opposite situation of that which it intended to achieve, and hence requires review and adjustment. The coefficient of *school* is negative and significant in the inequality equation. It is because increasing human capital can reduce unemployment and thus improve the fairness of income distribution. The majority of literature supports the notion that the age dependency ratio increase the degree of income inequality. The coefficient of *agedep* is significantly positive and consistent with the anticipation.

5. Robustness Check Analysis

Dackehag and Hansson (2012) emphasizes that the relationship between effective tax rates and growth may be nonlinear. The reason is that higher tax rates may be more distortionary and, thus, impact growth negatively, whereas lower tax rates may generate revenues that are spent in productive ways. Therefore, using a linear model may be biased. To investigate this concern, we add the squares of effective capital income tax rates to re-estimate the aforementioned results.

In Table 5, the Breush and Pagan test shows that the calculated χ^2 value is equal to 4.268 (resulting in a p value of 0.039), meaning that the residuals of the growth and inequality equations are significantly correlated. Therefore, using SUR estimation method is appropriate.

Table 6 presents the estimated results of the nonlinear model. In the growth equation (Columns (1)), the coefficients of *tk* are significantly negative and the coefficients of tk^2 are significantly positive. The results suggest that the relationship between growth and effective capital income tax rates is closer to a second-order polynomial function. Therefore, an U-shape exists. In other words, growth first decreases as capital income taxes increase, but after a certain point, growth becomes positive. The estimated results of the inequality equation are presented in Columns (2). The coefficient of *tk* is significantly negative and that of tk^2 is significantly positive. The conclusion that a nonlinear relationship between capital income taxes and inequality is supported again in the inequality equation. However, the quadratic term is very small and only weakly significant in both cases, so overall effect of capital tax on growth (inequality) is negative (positive).

6. Conclusion

Existing theories support a variety of perspectives on the effect of capital income taxes on growth and income inequality. An empirical evaluation is therefore required. This study compiles international data from OECD countries between 1990 and 2013 to review this issue. Two equations are developed, namely, a growth equation and an inequality equation. These two equations both include the effective capital income tax rate as the explanatory variable. The panel SUR method is used to counteract contemporaneous correlation problems. In addition, for avoiding the potential endogeneity of capital income taxes, the instrument estimation technique is adopted. The proxy variable of income inequality is the Gini index and the effective capital income tax rate is calculated using the formula developed by Mendoza et al. (1994).

Three major results are derived from this study. First, in the growth equation, the estimated coefficient of capital income tax rates is negative and significant. The concepts derived from this study are consistent with traditional wisdom that taxing capital income is harmful for growth. Second, in the inequality equation, the estimated coefficient of capital income tax rates is also statistically negative. Therefore, imposing capital income taxes reduce income inequality. In other words, it promotes income redistribution. Finally, using a non-linear model that includes the capital tax rates as a covariate, we discover empirical support for a non-linear relationship in both growth and inequality equations. The empirical results suggest that the negative effects of capital income taxes on growth and income redistribution decline as the capital tax rate increases.

Governments worldwide are committed to solve problems of economic recession and income inequality. According to the results of this study, a decrease in capital income taxes may achieve the purposes of solving the problems associated with growth recession. However, it may also cause the gap between the rich and poor to widen. Therefore, when formulating tax regulations, policy-makers

should consider the impact of capital income taxes on both growth and income inequality.

References

Arnold, J. (2008) "Do Tax Structures Affect Aggregate Economic Growth?" OECD economics department working papers, No. 643.

Baltagi, B. (2008) "A companion to econometric analysis of panel data, Hoboken" NJ: John Wiley & Sons.

Barro, R.J. (1991) "Economic Growth in A Cross-Section Of Countries" *Quarterly Journal of Economics* **106**, 407-443.

Barro, R.J. (1995) "Inflation and Economic Growth" *Bank of England Quarterly Bulletin* **35**, 166-176.

Barro, R.J. (2001) "Human Capital and Growth" *American Economic Review* **91**(2), 12-17.

Barro, R.J. and J.W. Lee (2010) "A New Data Set of Educational Attainment in the World, 1950-2010" NBER working paper No. 15902 Issued in April 2010.

Breusch, T.S. and A.R. Pagan (1980) "The LaGrange Multiplier Test and Its Applications to Model Specification in Econometrics" *Review of Economic Studies* **47**, 239–254.

Chamley, C. (1986) "Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives" *Econometrica* **54**, 607-622.

Cornia, G.A. (2012) "Inequality Trends and Their Determinants: Latin America Over 1990–2010" WIDER working paper 2012/09. Helsinki: UNU-WIDER.

Dackehag, M. and Å. Hansson (2012) "Taxation of Income and Economic Growth: An Empirical Analysis of 25 Rich OECD Countries" working papers 2012:6, Lund University, Department of Economics.

Dollar D. and A. Kraay (2004) "Trade, Growth, and Poverty" *Economic Journal* **114**(493), F22-F49.

Feldstein, M., 1995, "Fiscal Policies: Capital Formation and Capitalism" *European Economic Review* **39**, 399-420.

Gruner, H.P. and B. Heer (2000) "Optimal Flat-Rate Taxes on Capital–A Re-Examination of Lucas' Supply Side Model" *Oxford Economic Paper*, 52, 289-305.

Judd, K.L. (1985) "Redistributive Taxation in A Simple Perfect Foresight Model" *Journal of Public Economics* **28**, 59-83.

King, R.G. and R. Levine (1993) "Finance and Growth: Schumpeter Might Be Right" *Quarterly Journal of Economics* **108**, 717-737.

Kunze, L. and C. Schuppert (2010) "Financing Social Security By Taxing Capital Income: A Bad Idea?" *FinanzArchiv* **66**, 243-262.

Lambert, P.J. and T.O. Thoresen (2012) "The Inequality Effects of A Dual Income Tax System" *The B.E. Journal of Economic Analysis & Policy*, 12, Iss. 1 (Advances), Article 29

Lee, Y. and R.H. Gordon (2005) "Tax Structure and Economic Growth" *Journal of Public Economic* **89**, 1027-1043.

Levine, R., N. Loayza and T. Beck (2000) “Financial Intermediation and Growth: Causality and Causes” *Journal of Monetary Economics* **46**, 31–77.

Lucas, R. 1990) “Supply-Side Economics: An Analytical Review” *Oxford Economic Paper* **42**, 293-316.

Mendoza, E.G., A. Razin and L.L. Tesar (1994) “Effective Tax Rates In Macroeconomics：Cross-Country Estimates of Tax Rates On Factor Incomes And Consumption” *Journal of Monetary Economics* **34**, 297-323.

Mendoza, E.G., G.M. M-F and P. Asea (1997) “On The Ineffectiveness of Tax Policy in Altering Long-Run Growth: Harberger's Superneutrality Conjecture” *Journal of Public Economics* **66**, 99-126.

Poterba, J. M. (2007) “Income Inequality and Income Taxation” *Journal of Policy Modeling* **29**, 623-633.

Sinn, H. (1985) “Capital Income Taxation and Resource Allocation” *Studies in Mathematical and Managerial Economics* **35** (North-Holland, Amsterdan).

Plümper, T. and V.E. Troeger (2012) “Tax Competition and Income Inequality: Why Did The Welfare State Survive” working paper, the university of Warwick, No.83.

Uhlig, H. and N. Yanagawa (1996) “Increasing The Capital Income Tax May Lead to Faster Growth” *European Economic Review* **40**, 1521-1540.

Zellner, A. (1962) “An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias” *Journal of the American Statistical Association* **57**, 348-368.

Table 1:

Summary of Variables, Descriptions, and Data Sources

Classification	Variable Name	Description	Source
Dependent var.	*growth*	Growth rate of real GDP per capita	WDI
	inequality	Gini index	WIID
Independent var.	*tk*	Effective tax rate on capital income	OECD
Other Control var.	*invest*	Gross fixed capital formation to GDP	WDI
	infla	Inflation rate, calculated from CPI	WDI
	gcons	Government consumption expenditures to GDP	WDI
	school	Years of completed schooling for persons aged 25 and over	Barro and Lee (2010)
	open	Sum of imports and exports of goods and services to GDP	WDI
	gdpper90	The logarithm of real GDP per capita in 1990	WDI
	agedep	Age dependency ratio (% of working-age population)	WDI

Notes：WDI, World Development Index, published by the World Bank; WIID, World Income Inequality Database, published by UNU-WIDER; OECD, OECD database, published by the OECD.

Table 2:
Average Statistics by Country from 1990 to 2013

	growth	*gini*	*tk*	*invest*	*infla*	*gcons*	*school*	*open*	*ingdpper90*	*agedep*
Australia	1.84	34.90	65.70	26.14	2.99	17.70	11.79	38.81	10.13	49.31
Austria	1.72	29.15	34.75	22.89	2.25	19.07	8.76	89.92	10.24	48.11
Belgium	1.29	30.09	60.19	20.61	2.22	22.22	10.07	144.90	10.24	51.27
Canada	1.18	32.43	96.80	21.29	2.21	21.04	11.20	66.19	10.24	45.93
Chile	3.95	54.36	41.79	22.66	2.39	11.13	9.13	63.89	8.32	51.98
Czech Republic	1.68	24.89	32.12	26.46	4.27	20.77	11.71	115.38	9.19	44.75
Denmark	1.06	24.70	75.49	19.02	2.21	26.34	9.74	84.80	10.50	50.51
Estonia	5.07	33.71	28.48	27.66	12.82	20.02	10.75	153.57	8.44	49.86
Finland	1.43	26.88	54.87	20.14	2.18	22.91	8.97	70.45	10.24	50.03
France	1.06	32.70	44.11	19.05	1.85	23.52	9.05	50.37	10.23	53.58
Germany	1.59	29.32	38.05	19.94	1.88	19.14	9.93	67.60	10.24	48.38
Greece	0.83	34.02	19.95	20.19	6.60	17.13	9.24	53.84	9.64	48.73
Hungary	1.15	28.35	28.31	21.52	12.65	21.42	10.59	118.95	9.04	47.26
Ireland	3.55	34.28	51.32	19.42	2.50	17.22	10.96	150.56	10.01	51.87
Italy	0.64	34.03	44.84	20.11	3.15	19.45	8.59	48.74	10.01	49.07
Japan	1.16	24.90	52.04	25.28	0.45	16.85	10.78	23.05	10.35	49.06

Table 2 (Continued):
Average Statistics by Country from 1990 to 2013

	growth	*gini*	*tk*	*invest*	*infla*	*gcons*	*school*	*open*	*ingdpper90*	*agedep*
Korea	4.68	31.60	33.44	31.54	4.19	13.38	10.75	70.98	9.09	39.96
Luxembourg	2.30	30.76	77.47	20.74	2.37	16.14	9.48	256.19	10.83	47.54
Mexico	1.32	52.48	14.83	19.91	11.67	11.17	7.59	49.79	8.78	63.68
Netherlands	1.58	31.35	55.25	20.35	2.21	24.52	10.58	127.83	10.28	47.46
Norway	1.63	25.79	53.87	20.37	2.26	21.18	11.41	71.40	10.71	53.35
Poland	3.68	32.61	21.83	19.66	44.86	18.80	9.27	65.02	8.46	46.35
Portugal	1.48	38.07	36.97	23.21	4.25	18.73	7.27	66.25	9.53	49.32
Slovak Republic	2.21	24.05	21.94	27.46	5.87	20.74	10.90	135.26	9.10	45.08
Slovenia	1.92	29.02	19.82	23.29	7.45	19.02	11.20	121.15	9.43	43.88
Spain	1.43	32.76	33.89	24.32	3.50	18.30	8.70	51.92	9.84	47.24
Sweden	1.56	25.00	88.60	18.22	2.36	26.82	10.95	79.60	10.34	55.00
Switzerland	0.82	33.68	62.14	22.86	1.44	11.43	9.65	80.62	10.78	47.48
United Kingdom	1.66	35.87	83.33	16.85	2.80	20.19	8.89	55.99	10.16	52.94
United States	1.48	40.70	47.01	21.01	2.76	15.32	12.68	23.95	10.40	50.62

Table 3： Empirical Results:
Correlation Matrix of Residuals and Breusch-Pagan Test

Correlation matrix of residuals:

equation	growth	gini
growth	1.0000	
gini	0.1203	1.0000

Breusch-Pagan test of independence: chi2(1) =6.032, Pr = 0.014

Table 4： Empirical Results:
Seemingly Unrelated Regressions with Fixed Effect Panel Data Model

	(1)	(2)
Dependent Variable:	*growth*	*gini*
tk	-0.0327**	-0.0508***
	(-2.06)	(-3.15)
invest	0.2878***	-0.0496
	(6.23)	(-1.07)
infla	-0.0960**	0.0243
	(-2.02)	(0.50)
gcons	-0.0938	0.1369*
	(-1.29)	(1.82)
school	0.2414	-1.0679***
	(0.86)	(-3.68)
open	0.0798***	0.0112
	(5.81)	(0.81)
gdpper90	-0.7261**	
	(-1.98)	
agedep		0.2254***
		(4.33)
Observations	417	

Notes： *, **, *** indicate that the coefficient is significant at the 0.1, 0.05, and 0.01 level, respectively. Numbers in parentheses are *z*-statistics. The first lags of each capital income tax rate are used as the instrumental variables to deal with the endogenous problem of the tax system. The time fixed effect is controlled.

Table 5：Nonlinear Model: Squares of the Effective Capital Income Tax Rates: Correlation Matrix of Residuals and Breusch-Pagan Test

Correlation matrix of residuals:

equation	growth	gini
growth	1.0000	
gini	0.1012	1.0000

Breusch-Pagan test of independence: chi2(1) = 4.268, Pr = 0.039

Table 6：Nonlinear Model: Squares of the Effective Capital Income Tax Rates

	(1)	(2)
Dependent Variable:	*growth*	*gini*
tk	-0.0327**	-0.0508***
	(-2.06)	(-3.15)
tk^2	0.0005*	0.0008*
	(1.86)	(1.96)
invest	0.2878***	-0.0496
	(6.23)	(-1.07)
infla	-0.0960**	0.0243
	(-2.02)	(0.50)
gcons	-0.0938	0.1369*
	(-1.29)	(1.82)
school	0.2414	-1.0679***
	(0.86)	(-3.68)
open	0.0798***	0.0112
	(5.81)	(0.81)
gdpper90	-0.7261**	
	(-1.98)	
agedep		0.2254***
		(4.33)
Observations	417	

Notes：*, **, *** indicate that the coefficient is significant at the 0.1, 0.05, and 0.01 level, respectively. Numbers in parentheses are *z*-statistics. The first lags of each capital income tax rate are used as the instrumental variables to deal with the endogenous problem of the tax system. The time fixed effect is controlled.

Figure 1:

Capital Income Tax Rate, Growth Rate, and Income Inequality

Figure 2:

Capital Income Tax Rate and Growth Rate in 2006

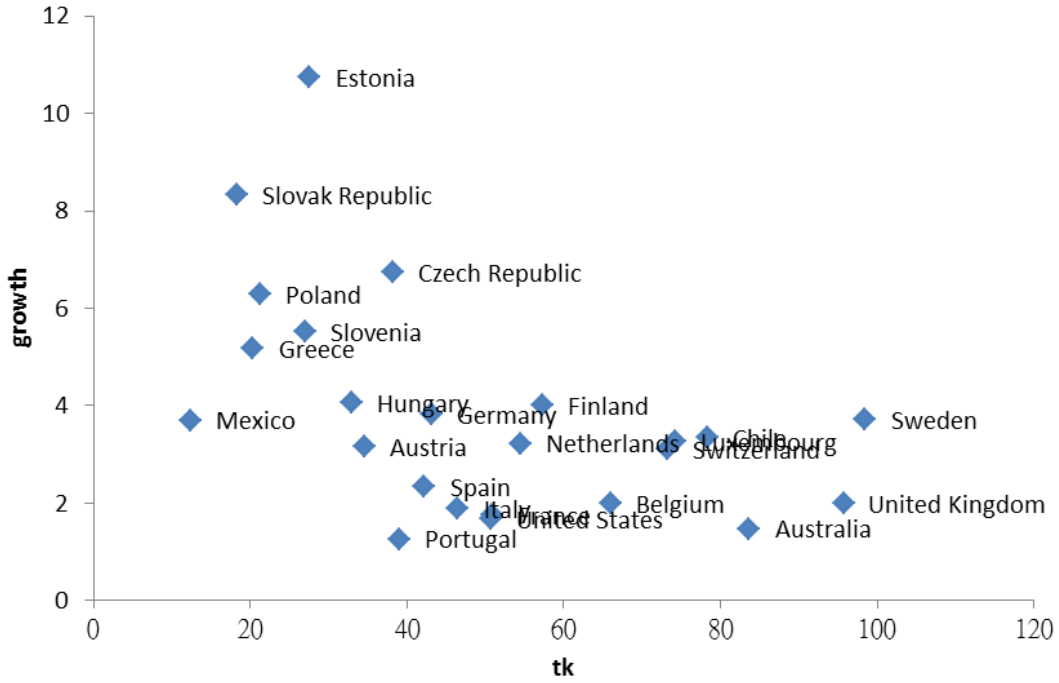

Figure 3:

Capital Income Tax Rate and Income Inequality in 2006