Essays on the Political Economy of Education and Income Redistribution

by

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Preface

This thesis consists of an introductory chapter and five essays. The third essay is joint work with Professor Vesa Kanniainen (University of Helsinki). The first essay has been published in *Regional Science and Urban Economics* and is printed here by the permission of Elsevier Science. The second essay and the third essay have been published in *International Tax and Public Finance* and are printed here by the permission of *Kluwer Academic Publishers*. 
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Contents

The Political Economy of Education and Income Redistribution: An Overview

Essay 1: Alternative Tax Constitutions and Risky Education in a Federation
   *Not included here*

Essay 2: Education, Mobility of Labour and Tax Competition
   *Not included here*

   *Not included here*

Essay 4: On the Political Economy of Social Security and Risky Educational Choices
   *Not included here*

Essay 5: On the Political Economy of Social Security and Public Education
   *Not included here*
The Political Economy of Education and Income Redistribution: An Overview

1 Introduction

Human capital differs from physical capital in that it is embodied in individuals, and cannot be transferred from one person to another. As individuals usually discover new information about their abilities during education, and have to choose the study field (or fields) long before knowing future labor market conditions, human capital investment decisions are made under uncertainty. Levhari and Weiss (1974) emphasize that, owing to these fundamental differences, risks associated with human capital investment cannot be diversified in the same way as risks associated with investment in physical capital. Furthermore, the provider of voluntary insurance for income risk related to human capital investments would suffer from the adverse selection problem, as people have private knowledge concerning their ability. This causes the problem of a missing insurance market for income risk associated with returns on education, implying that public intervention may improve welfare. Eaton and Rosen (1980) were the first to show that when returns on education are uncertain and cannot be insured privately, a linear wage tax can improve welfare even if lump-sum taxes are available. They also show that a linear wage tax may increase investment in human capital. Sinn (1995) argues that redistribution through taxation can be seen as an insurance device that makes lifetime careers safer, increases risk-taking and suffers from moral hazard.

The literature on taxation and human capital investment has concentrated on analyzing economies without migration. Mobility across national borders threatens national redistribution due to adverse selection. Beneficiaries seek out higher benefits, and net contributors prefer regions with modest or no redistribution. Musgrave (1969) views such behavior as an argument for assigning redistribution to national rather than local governments. Wildasin (1991, 1992, 1997) shows how the mobility of either beneficiaries or net contributors restricts redistribution between groups. At the same time, migration may provide market insurance for mobile factors of production, as
Wildasin (1995) demonstrates. Thus, migration may actually reduce the need for income redistribution.

This thesis combines these two different strands of the literature, and also literature on the political economy of redistribution with a heterogeneous population. It builds on the literature on optimal linear taxation when human capital is endogenous, integrating into such an analysis insights from the literature on tax competition and labor mobility. The emphasis is on models which deal with implications of uncertainty concerning the return on human capital investment. Two of the essays depart from this approach by analyzing a world without uncertainty. Two essays consider the consequences of population heterogeneity with a continuum of different abilities, thus departing from the usual framework, used in the three other essays, in which all individuals are ex ante identical before human capital investment, or constitute two distinct groups. As the models analyze individual decisions on education, the results are mostly relevant to education after compulsory schooling.

This thesis has three major theoretical goals. First, it aims to analyze the effect of redistributive linear taxation on human capital investment and optimal taxation in an economy without migration, allowing complementary factors of production in addition to human capital. In Eaton and Rosen (1980) and related literature, there are no complementary factors of production. Second, this thesis analyzes the effects of taxation on human capital investment and optimal taxation in a federation with migration. The first two essays analyze the implications of two different federal tax constitutions. In a federation with tax competition, the educated pay their taxes on wages (or salaries) to the region where they live. In a federation without tax competition, taxation depends on nationality instead of domicile. The educated pay their taxes on wages to the region which financed their education, independently of their domicile. Third, the last two essays analyze the political economy of income redistribution through social security when citizens have ex ante visible ability differences, and make discrete choices on education. The policy goal of this thesis is to contribute to the debate about the appropriate form of federalism in the European context.

As in the seminal work by Eaton and Rosen (1980), the analysis in this thesis is
restricted to linear taxation.\(^1\) Tuomala (1990) analyzes also optimal non-linear income taxation in the presence of educational choices. There are three alternative cases. In the first case, the government decides on publicly provided education. In the second case, individuals decide on their educational investment under uncertainty concerning their ability to utilize education. In the third case, individuals decide on education knowing their ability. In each case, individuals decide on labor supply after completing education to maximize their utility depending positively on consumption and negatively on labor supply. However, the derivation of results in that framework requires numerical simulations. Furthermore, education has only utility costs and no opportunity cost of lost wage income. Tuomala reports that in his specification, the differences in the distribution of gross income and disposable income are surprisingly small between the three cases. Furthermore, marginal income tax rates may be negative at the both ends of income distribution in order to compensate sacrifices in acquiring education. This differs from the traditional result of zero marginal tax rates at the both ends in the standard optimal income tax models. (Tuomala 1990, 106-121). Tuomala analyzes also optimal income taxation when income received with each possible effort level is uncertain. Uncertainty introduces an insurance component to taxation, and Tuomala’s numerical calculations suggest that marginal tax rates increase with income if income realization is uncertain before labor supply decisions are made. (Tuomala 1990, 136-157).

The thesis also analyzes several complementary theoretical issues:

(i) How does the optimal tax rate for the educated depend on the ownership of the fixed factor? Complementary fixed factor introduces diminishing marginal productivity of human capital. To the extent that the educated cannot capture the income accruing to the fixed factor, they capture as a group less than full returns on an increase in human capital. Therefore, a rent consideration may arise.

(ii) How do the effects of entering a federation depend on this ownership?

\(^1\)While it is more standard to allow non-linear taxation, the analysis is here restricted to linear taxation to derive results without numerical simulations. Furthermore, it may be impossible to characterize voting equilibrium on non-linear taxation due to the possibility of Condorcet cycles when citizens are heterogeneous.
(iii) What can be said about investment in education and welfare comparisons between an economy without migration and an economy with migration when there are region-specific shocks affecting the return on human capital?

(iv) Under what circumstances could the educated and the uneducated achieve a voluntary contract in which the uneducated participate in financing education?

(v) What are the effects of taxation on occupational choice, when different occupations have different income risks and individuals *ex ante* have different abilities?

(vi) How does the voting on social security with ability differences differ between a funded system in which each generation pays for its own education and social security, and a pay-as-you-go system allowing intergenerational income redistribution?

The second section of this introductory essay presents some crucial findings from the literature. It is divided into subsections corresponding to three different strands of the literature underpinning this thesis, and a subsection describing findings on labor mobility in the European Union and in the United States. The third section summarizes the five essays.

# 2 The Framework and Some Crucial Findings from the Literature

## 2.1 Education and Taxation

Suppose that there is no uncertainty related to the return on education, monetary cost of education consists of the opportunity cost of lost wage income and other tax-deductible costs, education has no non-monetary costs or benefits, and demand for leisure is constant. The linear wage tax then has no effect on human capital investment, as it reduces cost and returns proportionately. This has been demonstrated by Heckman (1976) using a life-cycle model with demand for leisure constant. Taxation may, however, affect human capital investment when any of these restrictive assumptions is relaxed.

Levhari and Weiss (1974) stress that uncertainty related to return on education
does not imply that investment in human capital is necessarily discouraged. The crucial question is whether the variance of return on education increases or decreases with the level of investment in education. Levhari and Weiss show that if variance of income earned with education increases with the level of education, risk-averse individuals then choose less education than without uncertainty. If the variance of income earned decreased with the level of education, risk averse individuals would invest more in education under uncertainty than without it.

The possibility of moral hazard and adverse selection seems to rule out voluntary insurance against uncertainty concerning the returns on education. Eaton and Rosen (1980) note that insurance would provide the person insured with an incentive to work less hard, and spend less time seeking a better paid job. Thus insurance can only be partial. However, even keeping insurance partial does not solve the adverse selection problem. Sinn (1996) emphasizes the timing problem of private career insurance. Parents cannot make a binding contract for their children’s future income. The uncertainty concerning the future prospects of children is actually greatest before they are born and will decrease with age. Private insurance contracts concerning future income become conceivable only when children are grown up, but at that time uncertainty concerning future prospects is only a fraction of the uncertainty before the children were born or went to school.

If the insuree has private knowledge about his ability, the insurer would probably suffer from the adverse selection problem. Good risks, that is, people with a high expected income, would not like to buy insurance that would almost certainly mean a substantial loss of income. Sinn (1997) analyzes a model in which there are two types of uncertainty, innate ability and a random factor that augments differences in innate abilities. If individuals have superior knowledge of their own innate ability and if the variance of innate ability is large enough compared to the variance of residual risk, the insurance market will break down at least for good risks with high innate ability, and may break down completely. Redistributive taxation does not face this adverse selection problem.

Since the absence of private insurance leaves room for a publicly provided insurance-
like tax scheme, the justification for taxation is different from the traditional justification for Pigouvian taxation used to correct external effects. Eaton and Rosen (1980) contribute to the literature on human capital investments by incorporating taxation and uncertainty simultaneously. They assume that the return on human capital investment is the product of the expected return and a random variable with an expected value of one. This implies that absolute income risk increases with human capital investment. Eaton and Rosen show that if returns on education are uncertain, a higher expected utility can be attained by having a positive wage tax rate and returning tax revenues as a lump-sum transfer. This result holds even with an endogenous labor supply, at least for sufficiently low tax rates.

Hamilton (1987) shows that increasing the lump-sum transfer induces individuals with decreasing absolute risk aversion to choose more education, if the labor supply after education is inelastic and uncertainty about the return on education is multiplicatively separable from the duration of education. If education increases productivity and students are risk-averse, lump-sum transfers to the young can thus increase the expected welfare, both by stimulating desirable risk-taking and by acting as insurance. If taxation is distorting, non-lump-sum allocations to students can be more cost-efficient in increasing the human capital investment, because they decrease the marginal cost of time spent on education, whereas lump-sum transfers operate indirectly by increasing assured income and thus encouraging bigger risk-taking when absolute risk-aversion is decreasing. On the other hand, too generous a transfer system may even lead to the risk of overinvestment in human capital.

The first two essays of this thesis build on the framework developed by Eaton and Rosen (1980). In the following, their framework is presented when interest income is not taxed. There are two periods of duration one. In the first period, an individual divides the available time between education $H$ and work $(1 - H)$. Furthermore, the individual decides on first-period consumption $C^1$. Initial wealth $W^1$ and first-period wage $w^1$ are given. The wage tax rate $t$ and interest rate $r$ are constant. The nonhuman wealth at the beginning of the second period is
\[ W^2 = (1 + r)[W^1 + (1 - H)(1 - t)w^1 - C^1]. \]

The second-period wage is the product of the expected human capital \( h(H) \), where \( h' \geq 0 \) and \( h'' \leq 0 \), and a positive random variable \( x \) with the expected value of one, \( E(x) = 1 \). In the following, argument \( H \) of \( h(H) \) is suppressed for notational simplicity. The second-period consumption is thus

\[ C^2 = (1 - t)xh + W^2. \]

An individual chooses the duration of education and the first-period consumption to maximize the expected lifetime utility:

\[ \max_{H, C^1} \{ E[u(C^1, C^2)] \}. \]

The utility function is concave and increasing in both arguments. The first-order condition for an optimal \( H \) is then

\[ E(u_2 F) = 0, \quad (1) \]

where

\[ F \equiv (1 - t)xh' - (1 + r)(1 - t)w^1. \]

The first-order condition for the first-period consumption is

\[ E[u_1 - (1 + r)u_2] = 0. \quad (2) \]

Eaton and Rosen analyze first the effect of wage tax rate on education when the first-period consumption is fixed at the level \( C^1 \). Differentiating (1) with respect to \( H \) and \( t \) gives then as the effect of the wage tax rate on the duration of education

\[ \left( \frac{dH}{dt} \right)_{C^1} = \frac{E(u_{22} F I)}{E[u_{22} F^2 + u_2 (1 - t)x h''].} \]
where

\[ I \equiv xh + (1 + r)w^1(1 - H). \]

Eaton and Rosen demonstrate that if first-period consumption is held constant, then earnings taxation increases investment in human capital if absolute risk aversion is constant. When also first-period consumption is endogenous, the effect of the wage tax rate on education can be found by totally differentiating the first-order conditions (1) and (2) with respect to the individual decision variables \( H \) and \( C \) and the wage tax rate \( t \). This yields a matrix equation

\[
\begin{bmatrix}
  X_{HH} & X_{HC} \\
  X_{HC} & X_{CC}
\end{bmatrix}
\begin{bmatrix}
  dH \\
  dC
\end{bmatrix}
= \begin{bmatrix}
  X_{Ht} \\
  X_{Ct}
\end{bmatrix}
dt,
\]

where

\[
X_{HH} = E\left[u_{22}F^2 + u_2(1 - t)xh''\right]
\]
\[
X_{HC} = (1 + r)E(-u_{22}F)
\]
\[
X_{CC} = E[u_{11} + (1 + r)^2u_{22}]
\]
\[
X_{Ht} = E(u_{22}FI)
\]
\[
X_{Ct} = -(1 + r)E(u_{22}I).
\]

Cramer’s rule allows to solve

\[
\frac{dH}{dt} = \left( \frac{dH}{dt} \right) \lambda - \frac{X_{HC}X_{Ct}}{\Delta},
\]

where \( \Delta \equiv X_{HH}X_{CC} - (X_{HC})^2 \) and \( \lambda \equiv X_{HH}X_{CC}/\Delta > 1 \). \( \Delta > 0 \) by the second-order conditions of utility maximization. Denoting the degree of absolute risk aversion by \( A \equiv -u_{22}/u_2 \), it is possible to establish that if absolute risk aversion is non-increasing, then \( X_{HC} = (1 + r)E(Au_2F) \leq 0 \). If an increase in wage tax rate encourages human capital investment when the first-period consumption is fixed, then allowing the first-period consumption to vary further encourages human capital investment. The reason for this is that individuals may compensate part of the decrease in consumption caused by a higher wage tax rate by shifting consumption from the first to the second period, therefore lowering the absolute risk aversion in the second period.
When Eaton and Rosen analyze the effect of wage tax rate on human capital investment, they take other lump-sum taxes or transfers as given. When they analyze optimal wage tax rate, they take into account that changes in wage tax rate imply changes in other tax instruments with a given government revenue requirement. The government has a revenue requirement $R$ per each of its citizen over the two periods. The government’s objective is to choose the optimal tax rate and lump-sum tax or transfer to satisfy a given revenue requirement. The government takes the individual’s responses to tax rates into account and pools the tax revenue. Thus, by the law of large numbers, total government revenue will be constant independently of uncertainty concerning tax revenue from individuals. Formally, the government chooses the wage tax rate $t$ and the per capital lump-sum tax $T$ to maximize individual’s expected utility, subject to the government budget constraint

$$R = t\{E[(1 - L)\times h] + (1 + r)(1 - H)w^1\} + T,$$

where $L$ is endogenous leisure in the second period. Eaton and Rosen prove the optimality of relying at least partly on wage tax rates under uncertainty, independently of the effects of wage tax rate on human capital investment in the first period and labor supply in the second period. However, they do not derive the effect of government budget constraint satisfying simultaneous change in the wage tax rate and lump-sum tax on human capital investment. Hamilton (1987), on the other hand, proves that increasing the lump-sum transfer encourages human capital investment when absolute risk-aversion is decreasing and labor supply in the second period is inelastic. However, in his proof other taxes and transfers are taken as given.

In all the models of this thesis, it is assumed that human capital is an intermediary good and a homogeneous input in production. These assumptions follow the literature to which the thesis is linked. In policy applications, it should be remembered that there are equalizing wage differences when jobs have non-monetary advantages and disadvantages. The analysis of equalizing wage differences was pioneered by Adam Smith in The Wealth of Nations (Book I, Chapter X), and the literature has been summarized by Rosen (1986). Judd (1998) discusses the implications for optimal tax analysis of human capital being a final good or “bad”. The literature followed in this thesis
views education as a productivity-enhancing activity. It is assumed that productivity is directly observable, and that education does not act as a signaling mechanism, as proposed by Spence (1974). If education did not enhance productivity but acted only as a costly signal, allocations to students would be unoptimal. Furthermore, labor markets are assumed to be competitive and to clear. The production technology of human capital is taken as given. This thesis thus does not analyze the organization of education.

A rising marginal tax rate would provide more complete income insurance than linear taxation, but it would also mean that returns on education would be taxed more heavily than its costs. Nielsen and Sørensen (1997) argue that if capital income is subject to a positive tax rate and there is no uncertainty, progressive labor income tax is desirable on efficiency grounds. They argue that linear tax on labor income and a positive tax on capital income would distort investment decisions towards excessive human capital investment. Progressive taxation could negate this distortion. On the other hand, Hamilton (1987) argues that when returns on education are uncertain, a positive tax on interest income from physical capital may be optimal in order to increase human capital investment. Positive tax on interest income counterweighs the discouraging effects of uncertainty on human capital investment.

García-Peñalosa and Wälde (2000) compare the efficiency and equity effects of financing higher education through general tax revenue to loan schemes and a graduate tax collected from those who have received higher education. They argue that the graduate tax is better than other alternatives with uncertainty. Australia, New Zealand and the United Kingdom have adopted income-contingent loan schemes where maximum repayment is limited to loan and interest, whereas low-income workers pay back less than the full loan. Such a system requires general tax revenue to subsidize low-income workers, whereas graduate tax would avoid reverse redistribution from those not educated.2

Christiansen (1988) and Boadway et al. (1991) introduce models in which linear taxation affects occupational choice. Christiansen considers a case where workers have

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2For an analysis of the Australian Higher Education Contribution Scheme, see Chapman (1997).
ability differences, two occupations require different levels of ability, and there is no uncertainty. Boadway et al. (1991) allow households to choose between becoming entrepreneurs hiring workers at the market wage, or workers. Workers have no income risk, whereas entrepreneurs face a non-diversifiable risk. Individuals are heterogeneous, and the optimal linear income tax schedule is shown to depend on efficiency, equity, and insurance considerations.

2.2 Political Economy of Public Education and Income Redistribution

Eaton and Rosen as well as Hamilton analyze an economy where individuals are ex ante identical. If ex ante identical individuals choose their fiscal constitution behind a Rawlsian veil of ignorance, they should agree on redistributive taxation. In a world with a heterogeneous population, expected tax payments equal average tax payments only for a minority. Consideration of this predictable redistribution may outweigh insurance motivation in decision-making. Meltzer and Richard (1981) suggest that the share of income redistributed depends on the voting rule and on the distribution of productivity in the economy. In their model, productivity is exogenous, and there is no uncertainty. There is a large number of individuals. Everyone takes prices, wages and tax rates as given when deciding labor supply. The utility function $u$ is strictly concave in consumption $c$ and leisure $l$. Time endowment is normalized at one, and labor supply $n$ is given by $n \equiv 1 - l$. An individual with productivity $x$ earns pre-tax income $y$:

$$y(x) = xn(x).$$

In the following, the argument $x$ of $n(x)$ is suppressed for simplicity. The government collects a constant fraction $t$ of earned income to finance lump-sum transfers $r$ per capita. There are no savings, and therefore consumption is given by

$$c(x) = (1 - t)nx + r.$$
Each agent chooses labor supply to maximize utility:

$$\max_{n \in [0,1]} u(nx(1 - t) + r, 1 - n).$$

Meltzer and Richard prove that when leisure and consumption are normal goods, there is a unique value of $r$ that satisfies the government budget constraint for each $t$. Furthermore, individuals with higher productivity prefer lower tax rates, and therefore the decisive median voter is the one with median ability of all voters. Redistribution occurs in the political equilibrium only if the median voter has a lower than average income.

With overlapping generations, voting on taxation may depend also on the effects of redistribution on choices made by future generations. Already Pogue and Sgontz (1977) argued that the unfunded pay-as-you-go social security system provides a stronger incentive for current working age generations to invest in the human capital of younger generations compared to a fully funded social security system. Konrad (1995) presents an overlapping generations model in which the old generation controls political process. He argues that the old have an incentive to provide education and public infrastructure in order to increase social security tax revenue used to finance their benefits. Fernandez and Rogerson (1995) analyze education subsidies in voting equilibrium where people differ in terms of their initial income. They show that the rich and the middle class can exclude the credit-constrained poor from benefiting from subsidies to education by a suitable choice of subsidy rate.

Social security benefits are a major form of redistribution in most countries. In 1995, old age cash benefits amounted to 10-11 % of GDP in France, Germany and Italy. Also in all the other member states of the European Union except for Ireland, they amounted to more than 6 % of GDP. (OECD 1999). Kemnitz (2000) analyzes the political economy of social security and public education with three overlapping generations. In his model, the government chooses the social security tax rate to finance old-age benefits and the wage tax rate to finance public education for children. All agents belonging to a generation are ex ante identical, and the only form of uncertainty concerns whether the agent lives to the third period or not. The government maximizes a politically weighted sum of the utilities for workers and pensioners. Pay-as-you-go
social security system may stimulate public education expenditures, as workers expect that they will benefit during their old age of the next generation’s higher productivity.

As past contributions are sunk costs, majority of citizens may vote for the pay-as-you-go social security even when the younger generations would be made better off without it, and there is no uncertainty. This has been demonstrated by Browning (1975) and Cooley and Soares (1999) assuming that citizens differ only in age. Casamatta et al. (2000) introduce overlapping generations into the framework developed by Meltzer and Richard (1981). They analyze voting on social security with overlapping generations of citizens who have exogenous productivity differences. Voting on social security depends on the difference between the interest rate and the growth rate of population, as well as on the redistributiveness of the benefit rule. Cremer and Pestieau (2000) even argue that the threatening crisis of financing social security system is mainly due to political problems, and that economic and demographic factors play a relatively small role in it.

Rangel (2000) and Boldrin and Montes (2000) model explicitly public education and pay-as-you-go social security as two parts of intergenerational contract. Rangel (2000) shows that while a pay-as-you-go system may be self-sustainable if it generates a positive surplus for each participating generation, providing education for the younger generation is not sustainable without linking it into sufficiently big transfers to the old. Boldrin and Montes (2000) argue that pay-as-you-go social security system may encourage efficient human capital investment by increasing the stake that the current generation has in future production, thereby providing them an incentive to provide education publicly if private provision would lead to an inefficiently low human capital formation due to credit market constraints.

The last two essays of this thesis analyze voting equilibrium on wage tax rate used to finance social security benefits when individuals \textit{ex ante} have different expected returns on education. Voting may include both intragenerational and intergenerational conflict in an overlapping generations model with pay-as-you-go social security. Individuals make a binary choice on whether to acquire education or remain uneducated. In the fourth essay, both career choices may include income risk. The fifth essay studies
simultaneous voting on wage tax rate and public education without uncertainty. Tax revenue net of costs of providing education is returned as social security benefits.

It has been recognized that individuals who do not invest in education may nevertheless benefit from investments by others because of complementarities in production, spillovers, or effects on growth. Johnson (1984) analyzes a model with two ability types. High-ability agents can purchase college education with a constant cost to become high-skilled workers, or remain medium-skilled. Education subsidies can be used to neutralize distortions in educational choice caused by taxation, but also to influence income distribution. The desired subsidy rate for education depends on the production function and on the exogenous parameters of the tax system. Low-ability agents may benefit from subsidies for education, as these increase complementary input. The third essay analyzes a model with two distinct groups, high- and low-ability individuals. The two groups are complementary in production, and there are positive externalities between high-ability individuals in education. The third essay asks whether it can be in the interest of low-ability individuals to voluntarily subsidize educational investment by high-ability individuals. The two groups are allowed to face different tax rates.

2.3 Labor Mobility and Income Redistribution

According to Buchanan’s (1950) definition, a federal system is characterized by the presence of at least two layers of constitutionally independent governments which have power to collect revenues and expend these revenues. This means that the central government contains within itself several lower-level governments with well-defined geographical borders. For example, in the United States the central government is the federal government and the lower-level governments are the state governments. A central government may also be forthcoming in the European Union, although it does not, at least yet, have direct power to tax individual citizens. Member states are the lower-level governments. Fiscal federalism as defined by Boadway and Wildasin (1984) and Groenewegen (1987) is a field which studies the reasons for adopting a federal structure, the appropriate assignment of functions and revenue sources to various levels of government, the implications of free mobility, and the role of intergovernmental
transfers.

Migration of the factors of production arising from differences in marginal productivity ensures their most efficient use, and thus promotes welfare. However, it may also create an adverse selection problem for national governments. Sinn (1997) argues that without centralized action at the federal level, free mobility will result in fierce tax competition threatening to dismantle national income redistribution in the European Union. Christiansen et al. (1994) show how tax competition leads to benefits-taxation, where taxes paid by firms and households equal the sum of benefits they receive, as well as the marginal costs of production of the public goods and services they receive. Sinn (1997) argues that tax competition may lead not to inefficient provision of public goods but to redistribution from the fixed to the mobile factor. Wilson (2000) argues that if governments compete with services which enhance the productivity of the mobile factor, competition may be beneficial, as it reduces waste. Cremer et al. (1996) conclude from their survey of the literature that most studies agree that mobility makes it more difficult to tax or subsidize mobile factors.

Mobility of labor is potentially detrimental to income redistribution, including insurance-like redistribution, but at the same time, can act as an insurance mechanism. If regions face asymmetrical shocks, the possibility of migrating is an option which can be used in case of adverse shock. Wildasin (1995) shows how the possibility of migrating can make a redistributive system unnecessary or even harmful, because with migration costs redistribution reduces the incentives to migrate from low- to high-wage regions. Very extensive insurance for the mobile factor may even eliminate all incentives to migrate and thus destroy the efficiency gains from migration. Mansoorian and Myers (1993) stress that the idea of psychological benefit from living in one’s home region is of special interest in a federation that consists of culturally separate regions, such as the European Union.

The possibility of migration of the mobile factor may increase the income risk of the immobile factor of production, because migration aggravates the effects of region-specific shocks. However, under certain circumstances an increase in the mobility of one factor may hurt the owners of that factor and benefit the owners of a complementary
factor. Schöb and Wildasin (1998) analyze a model with long-term labor contracts, showing that an increase in labor mobility may result in more flexible labor market institutions, a decrease in the expected utility of risk-averse workers, and an increase in the expected profits of firms. Since the number of firms is fixed in their model, an increase in expected profits means an increase in the expected income of the fixed factor embodied in the firms.

In general, the effects of migration on different groups depend on the production function and may either increase or decrease the expected income of both the mobile and the immobile factor of production. Wildasin (1997) enumerates the results for the different types of production function. In the following, the main features of his model are presented. The first three essays of this thesis follow the same approach in modeling migration. There are two jurisdictions, denoted by subscripts $i$ and $j$, each of them containing two industries, denoted by subscripts $s$ and $t$. Both industries combine labor supplied inelastically by high-skilled workers to that supplied inelastically by low-skilled workers. Production functions for both industries in both countries are concave, identical, and exhibit constant returns to scale. The price of all goods is normalized at unity. Each industry in each jurisdiction contains $N$ unskilled workers. In the initial situation before migration, the number of skilled workers, denoted by $n$ with country- and industry-specific subscripts, is equal in both jurisdictions and in both industries. This implies that $n_{is} + n_{js} = n_{it} + n_{jt} = n$ and $n_{is} + n_{it} = n_{js} + n_{jt} = n$. There may be asymmetric initial distribution of high-skilled workers so that their relative number in the two industries differ across countries, assuming that $n_{is} \geq n_{js}$. Normalizing the production function by dividing by $N$ in order to analyze production per unskilled worker, the initial gross returns for skilled workers satisfy

$$f'_{is}(n_{is}) = f'_{jt}(n_{jt}) \leq f'_{it}(n_{it}) = f'_{js}(n_{js}).$$

The initial gross returns for unskilled workers satisfy

$$f_{is}(n_{is}) - n_{is}f'_{is}(n_{is}) = f_{jt}(n_{jt}) - n_{jt}f'_{jt}(n_{jt}) \geq$$

$$f_{it}(n_{it}) - n_{it}f'_{it}(n_{it}) = f_{js}(n_{js}) - n_{js}f'_{js}(n_{js}).$$

In a federation, high-skilled workers are costlessly mobile and low-skilled work-
ers immobile. With migration, high-skilled labor supplied in an industry in a jurisdiction is denoted by $l$ with an industry- and jurisdiction-specific subscripts. The full-employment conditions imply

$$l_{is} + l_{js} = n_{is} + n_{js} = n$$

and

$$l_{it} + l_{jt} = n_{it} + n_{jt} = n.$$

Each jurisdiction may levy a fixed per-capita tax $\tau$ for high-skilled workers in order to finance a transfer for low-skilled workers. Migration requires that net incomes of high-skilled workers are equalized across jurisdictions, and therefore the allocation of labor must satisfy in industry $s$:

$$f'_{is}(l_{is}) - \tau_i = f'_{js}(l_{js}) - \tau_j$$

and in industry $t$:

$$f'_{it}(l_{it}) - \tau_i = f'_{jt}(l_{jt}) - \tau_j.$$

These equations imply that the equilibrium allocation of high-skilled workers depends only on the differential of fiscal treatment of mobile workers in each jurisdiction. If taxation facing the mobile factor is identical across jurisdictions, taxation does not affect migration decisions compared with a laissez-faire outcome. The possibility of migration between the regions restricts the scope of each region to redistribute income.

Wildasin (2000) introduces a model in which all individuals are identical ex ante, and either acquire specialized skills or remain uneducated. In his model, human capital investment exposes workers to region-specific earnings risk. He compares private educational investments without taxation to publicly financed education. In his model, all educated workers pay a uniform lump-sum tax. Wildasin shows that if education has to be financed by local taxes and the educated become mobile, tax competition shifts the tax burden to the unskilled.
The theory discussed so far assumes the existence of benevolent governments that maximize the expected utility of their citizens. Brennan and Buchanan (1980) see tax competition as a virtue of the federalist system, because it restricts the possibility of regional governments overtaxing their citizens. However, Keen (1995) shows that if both central and lower-level governments tax their citizens and use at least some tax revenues in ways that benefit the citizens, coordination may still be desirable in some circumstances. Fuest (1995) argues that even with benevolent governments, tax coordination may be not optimal when there are publicly provided inputs. Fuest and Huber (1999) argue that tax coordination may be ineffective due to the interaction of different tax instruments. Furthermore, all the literature discussed so far analyzes horizontal tax competition. Dahlby (1996) concentrates on vertical tax and expenditure externalities which arise when state governments’ tax and expenditure decisions affect the federal government’s budget constraint and vice versa. In this thesis, the analysis is limited to horizontal externalities.

Literature analyzing tax competition generally focuses on noncooperative Nash behavior, as documented by Cremer and Pestieau (1996). Thus it is not surprising that the allocation of the redistributive branch to the federal level, or a corrective inter-regional transfer mechanism of the type proposed by Buchanan (1950) or Wildasin (1992), are usually suggested as remedies for redistribution problems caused by tax competition and mobility. This thesis follows the literature in modeling the interaction between governments as a Nash equilibrium. The situation where an individual jurisdiction’s government maximizes the expected utility of only its own citizens results from the political process if voters are not altruistic vis-a-vis citizens of other regions and the government maximizes the expected utility of its voters or citizens. When there are many jurisdictions, simultaneous-move uncooperative tax-rate setting seems a good approximation. It can be argued that, in the European Union, the presence of several bigger states makes Nash modeling a reasonable choice as long as taxation decisions are left to member states, although there may be some informal cooperation and negotiations between governments.

In this thesis, the interaction between the governments is modelled as noncooper-
ative Nash behavior. Migration introduces an additional constraint into the government’s maximization problem. Each government cares about its own citizens, or a group of citizens whose expected utility the government maximizes in its choice of the tax rate.

2.4 Empirical Results on Labor Mobility

There is an extensive literature on the determinants of migration, summarized in Greenwood (1997). Migration propensities tend to peak during the early to mid-twenties, and then decline at least until retirement. Furthermore, migration propensities tend to rise with education. In the United States, 32% of those with 5 or more years of college education migrated to another state in the age group 25 to 29 years between 1980 and 1985, whereas only 7% of those least educated in the same age group migrated to another state. (Greenwood 1997, 656). Already Sjaastad (1962) suggested that migration should be interpreted as an investment in human capital. Locality is chosen to maximize expected lifetime net benefits.3

Historically, labor mobility has been much higher inside the United States, Canada, Australia and New Zealand than inside European countries. For example, 17 to 19% of population moved annually in the first group, whereas in Belgium, France, Great Britain, Ireland, the Netherlands and Sweden the share varied between 6 and 10%. (Greenwood 1997, 653). The results are similar when one compares mobility between different states in the United States to migration between member countries of the European Union (EU). In 1991, 1992 and 1994, only 0.2% of EU population migrated from one member country or from abroad to another member country annually, whereas in the United States, annual migration flows between states were 2.6-2.9%. (Wellisch 2000, 4-5, 9). High labor mobility inside the United States has contributed to convergence in real per-capita income in the United States. While standard deviation of real per-capita income among eight geographical regions (New England, Mideast, Great Lakes, Plains, Southeast, Southwest, Rocky Mountain and Far West) was 42%.

3For a comprehensive review of literature on migration in developed countries, see Greenwood (1997).
of average in 1900, it had declined to only 13% in 1990. The standard deviation of per-capita income among the member states of the EU declined from 37% of average in 1960 to 24% in 1993. (Wellisch 2000, 4, 8).

Lower degree of labor mobility inside the EU can be explained to a great extent by wider cultural differences and different languages inside the EU. If all workers were of identical productivity, low figures would suggest that migration between member countries were not an important phenomenon, and that migration did not pose a serious threat to income redistribution inside the member countries. However, labor mobility tends to be much greater for high-wage and high-productivity individuals. Furthermore, the effects of tax-induced differences are much more important for this group than for population in average. While the marginal tax rate for high-income earners was in 1992 31% in the United States, it was 60% or more in Denmark, the Netherlands, and Sweden. (Tanzi 1995, 32-41). To some extent, many European governments may have cut highest marginal tax rates partly due to increased mobility of this group.4 15% of those who graduate from university emigrate each year from Sweden. (Eklund 1998). Furthermore, occupational licensing limits labor mobility between states more in the United States than in the European Union. The EU guarantees “science-based” specialists, like dentists, who are licenced in one member country a right to practise their occupation in other member countries immediately. In the United States, the qualifications often vary from state to state, thereby restricting mobility. (Kleiner 2000). Therefore, improved language skills may imply considerably higher mobility of European specialists in future.

Current level of much lower labor mobility inside the EU is not in itself a proof that tax competition would not become much fiercer in the future. Tanzi calls certain aspects of globalization and new technology “fiscal termites”. While the current effects on tax revenue would seem to be small, the fiscal termites may be “busily gnawing at the foundations of the tax systems”. (Tanzi 2000). Favorable tax treatment to key

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4 Central government top marginal tax rates on earnings were cut between 1980 and 1992 by more than 10 percentage points in Austria, Belgium, Greece, Italy, the Netherlands, Portugal, Sweden and the United Kingdom. (Wellisch 2000, 7).
personal may be an example of such a termite, and increasing working abroad another
as it provides more opportunities to conceal income than working in only one country.

There are several reasons to expect that labor mobility of highly educated workers
may increase significantly inside the EU. First of all, free labor mobility, established
at the beginning of the year 1993, is a relatively new phenomenon. Improved language
skills and student exchange programs are likely to increase mobility of high-skilled
professionals in future. For example, the number of students participating in EU
exchange programs has risen from 3 000 in the academic year 1987-1988 to over 90 000
Communities 2000). These numbers capture only exchange through Socrates program
launched in 1995 and its predecessor Erasmus program.

Two important issues not analyzed in this thesis are migration motivated by welfare
beneﬁts, and future accession of new member states in the EU. To a great extent, these
two issues are interrelated in the European context. Sinn (2000) suggests that while
mobility of workers from new member countries should not be limited, the migrants
should not have access to the social welfare system of their new residence country.
This restriction, which might be eliminated after the income convergence between old
and new member states has reached a sufﬁcient level, would allow the relatively gen-
erous income redistribution and social welfare programs of the current EU member
states to survive also after new member states have been admitted. Otherwise, west-
ward migration might force current member states to scale down their social programs
significantly.

3 The Contents of the Thesis

The five essays of this thesis each contribute to the analysis of education and income
redistribution in different ways. Three of these five essays also analyze the implications
of labor mobility. In the ﬁrst two, the emphasis is on linear taxation as a solution to
the problem of non-existent insurance markets. These essays analyze both an economy
without migration and a federation with alternative tax constitutions. These two
essays are complementary. For example, while the first essay includes also endogenous leisure, it relies on a more restrictive utility function for first-period consumption than the second essay without endogenous leisure. Furthermore, the first essay analyzes a small federation where regions have market power and there are no region-specific shocks, whereas the second essay assumes an atomistic federation but allows region-specific shocks. The third essay assumes that there is no uncertainty concerning the returns on education, but that there is a positive externality in the educational process. It asks whether the uneducated might be willing to participate in financing education if the educated and the uneducated are complementary in production. The third essay was jointly written with Vesa Kanninen. The fourth and the fifth essays are companion papers. Both analyze the political economy of income redistribution through social security when citizens differ ex ante in their productivity as educated workers. The young citizens make a binary choice on whether to become educated or remain uneducated. Both essays allow tax evasion and compare voting on social security with a generational budget constraint and with a pay-as-you-go system. The fourth essay studies the effects of taxation on educational choice when the two careers are associated with different income risks. The fifth essay analyzes simultaneous voting on social security and resources devoted to public education.

*Alternative Tax Constitutions and Risky Education in a Federation*

The first essay proposes and analyzes a two-period model with endogenous human capital. In the first period, risk-averse individuals are students dividing their time between risky education, leisure, and work for a constant wage. In the second period, they supply their human capital to the labor market as educated workers, their human capital being the product of the duration of education and a positive individual-specific random variable. There are no other education costs. If there is migration, the educated may migrate at the beginning of the second period. In production, human capital is combined with a complementary fixed factor. Students work in a separate labor-intensive service sector with a linear production function. The tax system con-
sists of a constant linear wage tax for the educated and students, and a proportional
tax or subsidy for the income accruing to the fixed factor. The expected tax revenue
is returned to students as a lump-sum transfer.

The individual’s utility is assumed to be separable in consumption and leisure.
Utility from the first-period consumption is linear, whereas utility from the second
period consumption and from the first-period leisure is concave. The individual chooses
the duration of education, the demand for leisure, and the net saving in the first
period in order to maximize the expected lifetime utility. After solving for the effect
of taxation on human capital investment and the optimal human capital investment
for those to be educated, the first essay introduces labor mobility. It is assumed that
the educated choose the region where their after-tax income is the highest. The first
essay introduces two alternative tax constitutions in a federation. In a federation
with tax competition, the educated pay their wage taxes to the region where they
live. In a federation without tax competition, taxation depends on nationality instead
of domicile. The educated pay their wage taxes to the region from which they have
received financial support as students independently of their domicile.

The framework of the first essay is an extension of the seminal article by Eaton and
Rosen (1980). The first extension is the inclusion of the complementary factor, which
induces a rent consideration when at least part of the income of this complementary
factor goes into a group separate from those to be educated. Because of diminishing
marginal productivity of human capital, the educated as a group do not reap full
benefits from human capital investment. Furthermore, it is assumed that the young
can freely divide their time between education, leisure, and work. Eaton and Rosen
(1980) and Hamilton (1987) assume that total time used for study and work is fixed
at a young age, whereas labor supply is endogenous for the educated workers. The
main contribution of the first essay is, however, analysis of the effects of migration on
taxation and human capital investment. Each government is benevolent to its citizens,
choosing the generational tax rate in order to maximize the expected utility of individu-
als who belong to that generation. This allows avoidance of issues of generational
conflict.
The main results can be summarized as follows. In an economy without migration, linear taxation increases both demand for leisure and human capital investment. If the educated reap full returns on education, the government always prefers a strictly positive tax rate. Furthermore, the government prefers higher human capital investment than individuals choose in the tax optimum. The reason for this is that social return on human capital investment is higher than private return. By pooling tax revenue, the government may return taxed income as an insured lump-sum transfer. If part of the returns on education is lost to the complementary factor, the government may prefer, because of rent considerations, to have less human capital investment than individuals would choose at the tax optimum. This can be achieved by lowering the tax rate in order to leave more of the risk uninsured.

When analyzing a federation, it is assumed that all regions are identical. This makes it possible to isolate the effects of the tax constitution in the change from being an economy without migration to becoming a member state of a federation from the effects which would be felt if the federation had centralized taxation. When regions are identical, they end up having identical tax rates in the Nash equilibrium. In a federation with tax competition, a marginal increase in taxation in one region increases human capital investment in that region, whereas human capital investment in other regions may either increase or decrease. Regions have an incentive to compete for the tax base, human capital, by cutting tax rates. A decrease in the wage tax rate creates a negative externality on other regions. At the same time, the rent consideration arising from the decreased marginal productivity of human capital is alleviated by migration. When both effects are taken into account, it can be shown that tax competition generally tends to lead to lower tax rates than in an economy without migration. Furthermore, an enlargement of a federation further lowers wage taxation as tax competition is intensified.

When taxation depends on nationality instead of domicile, a marginal tax change by one region has the same effect in that region’s human capital investment as it would have in an economy without migration. The regions choose higher tax rates in a federation with nationality-based taxation than without migration, at least if
the educated do not receive too high a proportion of the income accruing to the fixed factor. The reason for this is that migration dampens the negative effect of increased human capital investment on the marginal productivity of human capital. However, migration also means that those welfare gains for those to be educated resulting from higher revenue from the fixed factor leak to other regions to some extent. This lowers the regional benefits of higher human capital investment. If the educated receive a sufficiently high share of the income accruing to the fixed factor, it cannot be established whether the optimal tax rate is higher in an economy without migration or in a member state of a federation with nationality based taxation.

*Education, Mobility of Labour and Tax Competition*

The second essay is closely connected with the first. It has the same basic framework, with individuals facing uncertainty on the return on education, and government using linear taxes in order to finance a lump-sum transfer to students. The second essay follows Eaton and Rosen (1980) and Hamilton (1987) more closely than the first. In the second essay, the utility function is separable and concave with respect to both the first-period and second-period consumption. There is no endogenous leisure choice. The individual’s expected human capital is assumed to be a concave function of the duration of education. This is a more general formulation than in the first essay, where the function was assumed to be linear. The individual’s human capital is the product of his or her expected human capital, and an individual-specific random variable with an expected value of one. Furthermore, there is imperfect knowledge about future return on human capital. Following Wildasin (1995), this is interpreted as price uncertainty of the exported goods of the region. The production function is restricted to the Cobb-Douglas variety. The budget constraint is generational as in the first essay.

The analysis of an economy without migration shows that a lump-sum transfer to students financed by linear taxation induces students to increase their human capital investment. As labor supply is exogenous, the optimal tax rate would be one with constant marginal productivity of human capital. Clearly, the extreme nature of this
result follows from the absence of any distortions caused by taxation.

The second essay also analyzes both a federation with tax competition and one without. The second essay analyzes a large, atomistic federation in which all regions take the return on human capital as given. As in the first essay, the educated can migrate without cost. Regions are identical except for region-specific price shocks. Even with uniform taxation, region-specific shocks would induce migration. Migration decisions are made after the shocks have been revealed. The government’s budget constraint is restricted so as to hold in expected terms. It is proved that in a federation with tax competition, a lump-sum transfer to students financed by a linear tax creates an incentive for students to increase their human capital investment. The investment in education increases with the tax rate at least as long as increasing the tax rate also increases expected tax revenue from the educated. It is never optimal for the government to raise the tax rate to be so high that the negative tax base effect of migration reduces tax revenue more than the tax increase raises additional revenue from the initial tax base. In a federation without tax competition, an increase in the tax rate always increases human capital investment when the expected tax revenue is returned to students as lump-sum transfers. The optimal tax rate would be one.

When comparing educational investments and expected utilities between an economy without migration and a federation, the effects can be divided between the effects following from region-specific shocks even without any changes in taxation, and the effects of changes in taxation. In a federation without tax competition, both effects encourage students to choose longer education than in an economy without migration. In a federation with tax competition, students can choose either longer or shorter education than in an economy without migration. Without region-specific shocks, a decrease in taxation lowers human capital investment below the level in an economy without migration. With region-specific shocks and negligible individual-specific shocks, migration eliminates any reason for insurance through taxation. The effect of increased expected return on human capital dominates, encouraging students to choose longer education.

Welfare comparisons between a federation and an economy without migration can
go either way both for students and for the owners of the fixed factor. The latter always prefer a federation without tax competition to one with tax competition. Without region-specific shocks, an economy without migration is always better for students than a federation. With region-specific shocks, a federation offers efficiency gains, thus benefiting students. It also increases the income risk of the owners of the fixed factor, as migration amplifies region-specific shocks. Thus the expected utility of risk-averse owners of the fixed factor might be lower in a federation even if their expected income might increase. Risk-neutral owners of the fixed factor always prefer a federation without tax competition to an economy without migration.

Why Invest in Your Neighbor? Social Contract on Educational Investment

The third essay asks why the burden of financing higher education is typically shared by low-ability agents who themselves abstain from human capital investment. It suggests an answer based on two key mechanisms: externalities in education and complementarities in production. Large universities, isolated university campuses, and research institutes with a high concentration of trained human brains testify to the existence of positive externalities in the production of human capital. In the light of such evidence, one can expect that the resulting equilibrium tends to be characterized by underinvestment in human capital in systems with decentralized decision-making.

The third essay starts by characterizing decentralized human capital investment and income distribution. It assumes that human capital depends positively on both the student’s own investment, and on average investments by all students. The production process combines human capital provided by the educated and labor supplied by the uneducated through Cobb-Douglas technology. The net income of each group serves as a fall-back value in Nash-bargaining process, in which it is possible to separate the maximization of the surplus from its division between the two groups. Indeed, it is in the interest of both groups that the surplus be maximized regardless of its division. As an externality is involved, the market solution cannot lead to the maximization of surplus. The third essay also derives the sufficient condition for voluntary positive
transfers from the low-ability agents to the high-ability agents. This condition is that the relative bargaining powers of the two groups be determined by their income share of production. An increase in the bargaining power of high-ability agents would lead to further increases in the voluntary transfer from the low-ability agents to the high-ability agents.

In an open economy with global markets, factor mobility can undermine the social contract described above, especially if the cost of migration is low for the educated but prohibitive for the uneducated. The optimal behavior of the educated will be time inconsistent. The uneducated, in turn, have an incentive to become free riders; their willingness to commit to an educational subsidy vanishes as they rationally anticipate the inflow of educated individuals when the domestic net return on human capital exceeds that abroad. The resulting international tax optimum will be inefficient. Even worse, in a small open economy the low-skilled have a preference for zero contributions not only from themselves but also from the high-skilled, resulting in the risk of collapse of the education system. To develop the argument, note that the educated may migrate if their after-tax income is higher abroad than in their home country. Ex ante, they have an incentive to accumulate human capital in the form of publicly financed education. Ex post, however, they have an incentive to migrate to a country with lower tax rates and less human capital. Those who are uneducated will rationally anticipate such an incentive and, in equilibrium, no social contract which would generate publicly financed education in a small country can exist.

*On the Political Economy of Social Security and Risky Educational Choices*

The fourth essay analyzes risky occupational choices and voting on redistribution through social security in a world with a heterogeneous population and three overlapping generations. The young choose between occupation as uneducated worker and studying. The middle-aged work as educated or uneducated labor. Both the young and the middle-aged may engage in costly tax evasion. The old are retirees. Wage tax revenue is used to finance old-age benefits. Two alternative social security regimes are
studied: with generational budget constraint, each generation finances over its lifetime its own social security benefits. With pay-as-you-go social security, wage tax revenue from the current young and middle-aged generations is used to finance old-age benefits for the old.

The fourth essay first analyzes how taxation affects a discrete educational choice, say a decision on whether to obtain a college degree, when both the educated and the uneducated face income risk. Then it shows how the median voter would select the tax rate. As in the seminal work by Eaton and Rosen (1980), the analysis is restricted to linear taxation. This restriction implies that there is only one dimension in the political decision-making. If the tax system was allowed to be non-linear, the possibility of Condorcet cycles arises. Redistributive taxation creates dead-weight loss, as citizens may engage in tax evasion to escape their tax burden.

The effect of an increase in taxation on career choice is analyzed using the geometrical approach with a $\langle \mu, \sigma \rangle$ diagram as presented in Sinn (1983) and (1990). Sinn (1983) proves that it is possible to represent with a simple distributional assumption arbitrary von Neumann-Morgenstern preference structure as indifference curves in a diagram with expected value $\mu$ on the vertical axis and standard deviation $\sigma$ on the horizontal axis. The fourth essay proves that when the assumptions associated with $\langle \mu, \sigma \rangle$ diagram are satisfied, redistributive taxation encourages risky occupational choice with a higher expected private return. The result is expected to hold in countries with publicly financed higher education, independently of how the tax rate is chosen. The result need not hold with endogenous effort choice as in Konrad (2001). Tax revenue from those switching from less risky to riskier career choice increases. On the other hand, higher taxation may induce some citizens to evade taxes. This causes distortions and decreases tax revenue.

When the median voter has lower than average expected income, both pay-as-you-go social security and funded system based on a generational budget constraint are supported by a majority of voters. Pay-as-you-go system leads to higher wage tax rates, the majority consisting of the old and the middle-aged with low realized earnings, possibly supplemented by some young voters with lowest expected income.
Voting equilibrium is associated with tax evasion which causes enough distortions to outweigh marginal insurance benefit, redistributive gain, and potential gain from increased desirable risk-taking for the median voter of a further tax increase.

The presence of uncertainty increases wage taxation at least with a generational budget constraint if the two careers do not differ too much in their risk characteristics. Surprisingly, the result need not hold when the two careers differ considerably in their risk characteristics. Although redistribution may provide efficiency gains when the two careers differ in their risk characteristics, the inefficiencies induced by uncertainty reduce redistributive gains available to median voter, thereby discouraging wage taxation.

On the Political Economy of Social Security and Public Education

The fifth essay analyzes simultaneous voting on wage tax rate and public expenditures on education in a world with a heterogeneous population and three overlapping generations. Individual choices are as in the fourth essay, but there is no uncertainty. Instead, the productivity of those educated depends on both their ability and public expenditures on education. Wage tax revenue is used to finance both education and old-age benefits. The model can thus be interpreted as a “European economy” in which students do not pay for tuition. With generational budget constraint, each generation finances over its lifetime its education and social security benefits. With pay-as-you-go social security, wage tax revenue from the current young and middle-aged generations is used to finance education for the young and old-age benefits for the old.

The fifth essay characterizes conditions for a majority in favor of a joint existence of social security and public education. Neither system need survive alone. Education is provided publicly with a pay-as-you-go system only if social security tax rate is sufficiently high. A higher wage tax rate gives the uneducated and the middle-aged a bigger stake in the productivity increase created by public education, thereby creating incentives to invest more in it. On the other hand, nobody gains from a social security
system with a generational budget constraint if there is no public education, as the uneducated have same income. The results also suggest that with pay-as-you-go social security system, coalitions across generations and ability types may be different for a vote on the wage tax rate and for a vote on educational investment. Typically, the majority with a pay-as-you-go system consists of the middle-aged uneducated joined by the old in the vote on the wage tax rate and by the middle-aged educated and the young with lowest abilities in the vote on the public education.

References


