# Table of Contents

**Table of Contents**

1. **Research Statement**

   Social Security

   - The Political Economy of Social Security
   - Evaluating Social Security
   - Future Research on Social Security

2. **Public Funding of Education**

   - The Political Economy of Public Funding of Education
   - Future Research on Public Funding of Education

3. **Parental Altruism and Welfare**

   - Borrowing Constraints
   - Child labor

4. **Optimal Fiscal Policy**

   - Optimal Public Investment
   - Optimal Taxation
   - Future Research on Optimal Fiscal Policy
My main area of study is the political economy of government policies, particularly those that have a strong intergenerational redistribution component. Most of my research has revolved around two closely related topics: social security and public funding of education. The aim has been to find the factors that are important in the determination of such policies. This allows a reliable evaluation of the impact of these policies on individuals’ well-being, and it also provides a way of identifying policies that improve the welfare level of individuals as well as reform policies that are politically implementable. I recently initiated a new line of research where I address issues relating to optimal investment in public capital.

A unifying feature in my research is the use of macroeconomic theoretical modeling, such as dynamic programming and general equilibrium analysis, and novel simulation methods to provide new insights to issues that have been traditionally confined to the public finance and the development literatures.

A common thread runs through almost all of my projects: they underline the importance of using general equilibrium frameworks with explicit specifications of individuals' preferences in order to accurately evaluate the welfare implications of public policies.

I describe these projects below with references to specific research papers.

**Social Security**

**The Political Economy of Social Security**

Many studies have shown empirically that the social security system does not treat generations equally and is not “actuarially fair”. This raises the question of why such a system would be adopted in the first place and how it could be sustained if it treats later generations badly.

Much of the existing literature on social security evaluates social security using the partial equilibrium notion of actuarial fairness. This approach compares the return on funds contributed to the system with the returns that would have been earned had the funds been invested in bonds or in the U.S. stock market. In “A Positive Theory of Social Security Based on Reputation,” (with Thomas Cooley, Journal of Political Economy, Volume 107, Number 1, February 1999), we construct a general equilibrium model in which a pay-as-you-go social security system can be adopted and sustained as a political and economic equilibrium. We show that such partial equilibrium measures would not explain why social security is implemented and sustained.

Agents in our model economy vote for a given level of transfers. When each voter chooses her optimal level of benefits, she takes into account that the chosen policy influences factor prices. Positive social security benefits are associated with taxes that not only will decrease each worker's consumption and savings level but lower the labor supply and decrease the economy-wide stock of capital for the next period. The drop in next period's capital will increase the interest rate and decrease wages. This will have an
indirect positive effect on the share of income from capital. It turns out that the choice to implement and sustain a social security system depends crucially on this finding.

Recently, the viability of the existing system has come into serious question in public policy debates. As the baby boom generation ages, the share of the population over age 65 will increase even more dramatically. These demographic forces, combined with a trend toward earlier retirement, mean that, by early in the next century, there will be far fewer workers for every retiree collecting social security benefits than there are now and have lead many to predict the collapse of the system early in the century.

In “Will Social Security Survive the Baby-Boom?” (with Thomas Cooley, Carnegie-Rochester Conference Series on Public Policy, 45, 89-121, 1996), we extend our framework to address the primary issues of concern for the survival of a pay-as-you-go social insurance system. We describe an economic environment in which an initial population is offered the opportunity to choose a pay-as-you-go social insurance system in which the level of benefits can depend on the relative shares of different age groups in the population. In each subsequent period the generations alive at that time get to vote to continue with the system in place or abandon social insurance altogether. In this environment, realizations of the state variables can lead to abandonment of the social insurance system even though it was sustainable when put in place. The shares of the generations in the population follow a random walk. We trace out the evolution of this economy given the realizations of the shares of generations since the 1950's. Our model predicts that majority rule voters would already have abandoned social security. If social security is viewed as an entitlement for those who have already contributed over their working lives, the system will not be abandoned and will survive the baby boom.

Following predictions of the collapse of the social security system many proposals to reform the existing system have emerged in the literature. However, the issue of whether these reform proposals are politically feasible has been neglected in the discussions.

“Privatizing Social Security” (with Thomas Cooley, Review of Economic Dynamics, Volume #2, 731-755, 1999) studies the political sustainability of the existing pay-as-you-go social security system in the face of recent demographic patterns. We analyze different approaches to privatizing the system and consider what would be required for them to be politically implementable. We extend our framework and use it to consider the political viability of alternative ways of eliminating the current social security system and replacing it with private savings. We describe some transition policies that make current generations of agents at least as well off as the maintenance of the social security system.

The one striking conclusion that emerges from this search for feasible policies is the following: all feasible transition policies have to rely heavily on the use of debt to finance the transition. The use of debt, of course, shifts the burden to future generations. Those generations, however, would be willing to bear the burden because they would inherit an economy with a higher capital stock due to the higher savings that the privatization of the social security system would induce.
Evaluating Social Security

When evaluating how individuals fare under a social security system, much of the literature uses measures based on the notion of “actuarial fairness.”

Even though actuarial fair measurements might be an accurate way of comparing alternative private investments, they may be seriously misleading when applied to a public program such as social security. Social security is not an individual choice; it is a public policy that affects the behavior of all individuals in the economy. It distorts their savings and labor supply decisions and affects the aggregate level of capital and the supply of labor in the economy. Through its impact on the capital stock and on the effective labor supply, social security also affects the interest rate and wages, changing individuals' labor income and the return to their savings. In Cooley and Soares (1999), the authors found that, even though the net present value of benefits is negative for a majority of the population, the effects of social security on the rate of return to private savings and on wages are so important that social security is implemented and sustained as a political equilibrium in a majority voting process.

Even when social security does not affect factor prices, its impact on the individual decisions cannot be ignored when evaluating the welfare repercussions of this policy. Because in the presence of a social security system a tax rate is levied on individual's labor income, social security distorts labor-leisure decisions. Even when all benefits are earnings-dependent this effect is not negligible.

More importantly, social security can partially insure individuals against different types of risk when asset markets are incomplete. Until recently much of the literature on social security has ignored the insurance features of this policies. Hubbard (1987), Huggett and Ventura (1999) and Conesa and Krueger (1999) among others find that social security might play an important role as insurance against idiosyncratic risks such as lifetime and labor income uncertainty. Hubbard (1987) shows that when individuals face uncertainty over the lengths of their lives and there is a market failure in the private provision of annuities there might be large welfare gains associated to the public provision of annuities through social security.

Finally, in the presence of borrowing constraints, individuals are not able to reallocate resources optimally across their lives. In such an environment, an individual's well-being depends not only on the net value of the resources available over her lifetime but, more importantly, on the time at which these resources are made available. As discussed in Hubbard and Judd (1987), social security taxes labor income when it is more likely that the borrowing constraint is binding. Also, social security benefits cannot be optimally reallocated across time when agents' borrowing is restricted. Hence, an increase in social security benefits and taxation might make agents worse off even if it increases their lifetime resources.

In “Social Security Evaluation: a Critique” (forthcoming in Macroeconomic Dynamics), I show that, by ignoring these features, actuarially fair measures can grossly misevaluate the impact of social security on the well-being of an individual.

Moreover, because all the factors not accounted for by actuarial fair measures affect individuals differently, actuarial fair measures also misevaluate the redistributive properties of social security policies in terms of their impact on different agents' welfare.
**Future Research on Social Security**

Over the next few years I plan to continue to extend this dynamic political-economy framework to incorporate some important features that are missing and to address a richer set of questions.

The model economy I studied abstracts from many issues that affect the viability of social insurance. In particular, I do not address retirement decisions, nor do I allow for bequests by the oldest generation. All of these will affect equilibrium outcomes in important ways, but neither of them has been addressed satisfactorily in the existing literature. In future research, I intend to incorporate these factors in my model economy. This will involve a methodological innovation that will represent a substantial contribution to the literature.

In the environments I have described the social security system does not provide insurance in the sense envisioned by its original proponents. Nevertheless, social security may be motivated to some extent by pure insurance motives -- insurance against being born or retiring in a bad state of the world. The first best solution to this problem would be to consider contingent claim markets where individuals meet behind a Rawlsian veil of ignorance, in the sense that they ignore which future generation they will be born into, and exchange claims. I will study how a social insurance system compares to the insurance that results in such contingent claims markets.

**Universal and Earnings-Dependent Benefits**

Social security systems around the world differ across several dimensions. One of the features that has been the focus of recent literature is the connection between agents’ contributions to the system and benefits they receive upon retirement. In a Bismarckian system contributions and benefits are linked, while in a Beveridgean system benefits are independent of contributions. Considerable importance has been given to the reduction in the distortionary effect of social security taxation provided under the Bismarckian system. This has laid ground to the common perception that agents are better off with a social security system with earnings-dependent benefits, than with one with universal benefits. In this project, I discuss the inaccuracy of these presumptions, and I show that when social security is chosen in a democratic process agents might be worse off with a pay-as-you-go social security system when benefits are earnings-dependent.

**Public Funding of Education**

**The Political Economy of Public Funding of Education**

Existing theories of public education typically rely on altruism to account for the existence of such policy. In “Self-interest and Public Funding of Education” (Journal of Public Economics, Volume 87/3-4, 703–727, 2003) I argue that public investment in human capital can be a consequence of selfish behavior, and it does not have to be supported as an instrument of altruism, or as a consequence of positive externalities even when privately financed education is an option. It can instead be accounted for by the
existence of borrowing constraints and the presence of factor complementarities in the production sector.

The presence of complementarities between capital and labor in production implies that by improving the skills of next period’s workers public funding of education increases the return on capital. In the absence of a credit market for the young generations, the equilibrium level of private financing of education will be relatively low. Agents that get a relatively large fraction of their income from the return on their investments in physical capital will support a publicly financed education system in order to enhance their future income. This is what leads to the political choice of a publicly financed education system.

I show that these non-altruistic incentives to support public education are quantitatively important.

These findings underscore the importance of taking into account self-interest as a factor that generates support for education policies when evaluating reforms to the education system. This self-interest results not only the impact of education policies on factor prices, but on any other aggregate variables that affect the well-being of current voters, such as its effect on social security benefits, or other types of government transfers and taxation levels. Even in the presence of altruism, these effects might be important. They might generate significant changes in the support for public funding of education by agents that care for the well being of young agents, or they might motivate support for public funding of education by agents that do not care for school-aged agents.

“A Dynamic General Equilibrium Analysis of the Politics of Public Education” underlines the incentives driving the support for publicly funded education. I assess the relative importance of three factors in the determination of the equilibrium level of this policy: altruism, the impact of public funding of education on social security benefits, and its impact on factor prices. I show that the selfish motives of agents are important for all levels of altruism. I then study the impact of implementing a social security system on the equilibrium levels of education funding and on welfare. I find that although social security might generate support for public funding of education, its overall effect on the well-being of individuals is negative. This is true in the benchmark economy for any level of social security taxation.

In the first successful school finance lawsuit, the case of Serrano vs. Priest ruled that the California education system was unconstitutional for discriminating among students in access to education. Wealthier communities, with larger tax bases, spent more per student than poorer communities while subject to lower tax rates. Since the Serrano ruling, many states have been reforming their education systems to reduce inequality. Specifically, they have been moving toward state financing of education to equalize spending across students.

This has led research on public education to examine the impact of changes to the scope of education financing. The principal issues are the extent to which different education finance systems reduce inequality and how reform policies affect different types of agents. Previous studies have emphasized the intragenerational redistribution effects of moving from local to state-financed systems. While holding factor prices fixed the
analysis focuses on how school financing systems affect the amount of resources devoted to education and how these resources are distributed across students.

Broadening the scope of financing has intragenerational redistribution effects as well as intergenerational effects. In “Public Education Reform: Community or National Funding of Education” (forthcoming in the Journal of Monetary Economics), in a political economy model of public education funding, I evaluate the welfare implications of broadening the scope of education financing. I focus on the intergenerational distributional effects and find that significant welfare gains can occur despite the displacement of the median voter to an older agent that cares less about children's well-being.

Moreover, the model incorporates a pay-as-you-go social security system and in contrast to existing theories does not assume that factor prices are invariant. I study the impact of a reform of a local education system to a nationally-financed system where voters internalize the effect of the education policy on factor prices and on social security benefits. I find that this reform can lead to very large welfare gains.

Future Research on Public Funding of Education

Human Capital Spillovers

The range of estimates for the elasticity of the increase in educational attainment with respect to spending per pupil is very wide, and the conclusions from the literature on the evidence of the impact of (public) school quality on learning are mixed. These values range from -0.01716 to 0.1322. Card and Krueger (1994) survey the literature on the economic returns to school quality, and they observe that 25 estimates of the elasticity of earnings with respect to spending per pupil range from 0.01 to 0.29 with the average of the estimates being 0.16. It seems clear that the literature has failed to find a consistent relation between spending in education and the quality of education. Furthermore, the observed levels of spending on education do not seem to agree with a weak relation between educational attainment and spending.

In “Human Capital Spillovers and the Effectiveness of Public Funding of Education,” I will draw on findings from some of my previous research to show that with a plausible specification of preferences and technologies we can generate a weak correlation between education spending and human capital. I hope to show that this result can hold even when, ceteris paribus, education spending strongly affects education attainment.

Parental Altruism and Welfare

Borrowing Constraints

“Borrowing Constraints, Parental Altruism and Welfare” investigates the impact of borrowing constraints on welfare. In a standard overlapping-generations model where parental altruism results in transfers that children allocate to consumption and education, the average level of welfare is higher when children cannot borrow against future income. The presence of a borrowing constraint increases parental transfers and raises children's welfare.
Additionally, the inability to borrow reduces children investment on education, decreasing the aggregate level of human capital while borrowing constraints raise aggregate savings and, hence, physical capital. The latter effect dominates and, when prices are flexible, the positive welfare impact of the credit constraint augments.

**Child labor**

Only recently has the issue of child labor been the subject of a significant amount of formal economic analysis (see Basu (1999) for a survey of the theoretical literature). This surge in the literature on the economics of child labor is the result of the increased awareness of the existence of child labor around the world, and the concern that many of the interventions of different interest groups might have negative welfare impacts. It is therefore important to develop theoretical models that help us understand the incidence of child labor, as only then can we recommend and implement effective policy interventions.

An objective of this project is to investigate the impact of borrowing constraints on child labor and welfare and present another rationale for imposing restrictions on child labor. In a standard overlapping-generations model where parental altruism results in transfers that children allocate to consumption and education, borrowing constraints can reduce child labor. Moreover, a ban on child labor increases parental transfers and might raise children's as well as the average levels of welfare.

Another purpose of this project is to develop some alternative explanations for child labor and add to a debate that is still in its early stages of development. This paper provides a simple set-up that can yield “child labor traps” and sheds light on some theoretical features that should be considered when studying this problem.

I show that “child labor traps” can arise in equilibrium in standard overlapping generations models where parents care about their children and take into account the impact any decisions have on their children's lifetime utility. When interior solutions for both bequests and the accumulation of assets exist, there are equilibria where families with low levels of assets have children who provide high levels of labor while otherwise identical families have higher levels of wealth and children that work fewer hours.

If I allow agents to allocate resources to education, I can generate equilibria where some families are trapped in a poverty path that condemns their children to work. Low human capital families bequeath less to their children. This drives children to work and to allocate fewer resources to education; they accumulate less human capital and perpetuate their family's poverty. At the same time, otherwise identical families with higher levels of human capital and wealth have children that do not work and allocate more resources to education.

These equilibria are sub-optimal in the sense that average welfare levels are lower than in an equilibrium with intragenerational homogeneity.
Optimal Fiscal Policy

Recently, I initiated a new direction of research with Pierre Sarte and later also with Marina Azzimonti-Renzo.

The motivation is the lack of understanding of the determinants of public investment policy and the inability of the existing literature in explaining the observed cross-country patterns of public investment. Because time consistency is an important feature of all feasible policies we look at optimal policies with commitment as well as time-consistent policies. We start by looking at standard economic environments to facilitate the analysis of these two types of policies.

Optimal Public Investment

In 2001, the U.S. government spent $290 billion on public investments spanning such diverse projects as highways, aircraft electronics, sewer and water systems, government buildings, and conservation. This amount represents roughly 3 percent of GDP and is comparable in size to net exports. The literature has shown that the optimal share of gross public investment should equal the government capital elasticity of output. However, most influential papers in this literature utilize a very special class of growth models: endogenous growth models without transition dynamics. In these models, the elasticities of output with respect to private and public capital must add up to one. This restriction is empirically implausible because the private capital elasticity of output is approximately 0.36 in the U.S. economy. Thus, if this restriction were true, then the optimal share of public investment in GDP would be 0.64. In “Efficient Public Investment in a Model with Transition Dynamics,” (with Pierre-Daniel Sarte, Economic Quarterly, Vol. 89, Number 1, Winter 2003), we revisit the optimal choice of public investment in a more general and plausible model that allows for gradual transitions between steady states. Since endogenous growth is not essential to our argument, we revert to the more conventional growth model with exogenous technical progress.

Contrary to previous work, we show that the optimal share of gross public investment in output should be less than the public capital elasticity of output along a balanced growth path. Furthermore, this share depends importantly on underlying preferences and technology. Another finding is that the elasticity of final output with respect to public capital is likely to be relatively low at less than 0.1 if the observed U.S. ratios of gross public investment to output and of public capital to private capital are approximately optimal.

Moreover, the optimal sequence of public investments is not time invariant, and a policy aimed at implementing it is not time consistent;

In “Efficient Public Investment With and Without Commitment,” (with Marina Azzimonti-Renzo and Pierre-Daniel Sarte, Federal Reserve Bank of Richmond Working Paper Series, Working Paper #03-10, August 2003) we reconsider the problem of optimal public investment when the government uses income taxes to finance its purchases of public capital. In particular, we first explore the allocations that emerge under the Ramsey optimal plan. Our analysis shows that the time invariance of the optimal income tax rate found in virtually all previous work derives from special assumptions that also make it time consistent. In a more general framework, the optimal policy is neither constant nor time consistent.
We find that with full commitment, unlike in the model of Chamley (1986), a benevolent policymaker typically chooses a tax rate, or alternatively a share of public investment, that increases over time. He does not necessarily take advantage of the initial non-distortionary tax on capital but instead delays taxation in order to generate a “take-off” phase with higher consumption and higher private investment. This result hinges on the fact that higher levels of consumption in any period reduce the utility-denominated return to investment made in the preceding period through its effect on marginal utility. However, since no history exists prior to period zero, the policymaker can allow for high consumption in the initial period without concern for distortionary effects on past investment decisions. Thus, under full commitment, optimal policy suggests a “take-off” phase in which taxes and public investment are low, and both consumption and private investment are encouraged.

When optimal policy is constrained to be time consistent, long-run tax rates emerge, rather surprisingly, to be lower than under full commitment. Therefore, the inability to commit to future policy causes too little public investment in the long run. Under discretion, successive policymakers take as given the decision rule adopted by their successor. Each government then tends to “cheat” and to mimic the first period behavior of a Ramsey policymaker. Thus, steady state discretionary tax rates can end up lower than those under the Ramsey plan.

**Optimal Taxation**

In “Distortionary Taxes and Public Investment when Government Promises are not Enforceable,” (with Marina Azzimonti-Renzo and Pierre-Daniel Sarte) we characterize Markov-perfect equilibria in a setting where the absence of government commitment affects the financing of productive public capital. We show that at any date, a government in office only considers intertemporal distortions over two consecutive periods in choosing taxes. We then use our framework to quantify the value of commitment, which we define as that obtained from binding governments to a course of actions that produce the second-best allocations. Because this calculation relies on numerical approximations, we contrast alternative approaches in the literature. We find that both linear quadratic and perturbation methods deliver accurate steady states, but that the former can yield spurious policy implications along the transition. Ultimately, our analysis suggests that very small costs of setting up a commitment technology are enough to prevent its adoption. Furthermore, while households' decision to forego government commitment may be rational at some initial date, it is nevertheless the case that consumption allocations may differ considerably in the long run.

In the standard neoclassical model with a representative agent, a benevolent planner who can commit to future policies will, if feasible, levy a single confiscatory tax on capital in the initial period and commit never to set positive taxes thereafter. In “Optimal Policy and (the lack of) Time Inconsistency: Insights from Simple Models,” (with Marina Azzimonti-Renzo and Pierre-Daniel Sarte) we show that this policy, which allows for the disposal of distortional taxes entirely, can arise even when sequential governments are unable to credibly promise future tax rates, regardless of how public expenditures are determined. We suggest that Markov-perfect distortional tax rates emerge more naturally
in an overlapping generations setting. In that setting, an intergenerational distribution concern arises that limits the degree to which the initial old generation is taxed, in effect creating an endogenous upper limit on initial capital income taxes. Furthermore, this intergenerational objective reintroduces time inconsistency as a policy issue since, in a Markov-perfect equilibrium, taxes are set to equate marginal utilities of consumption across generations regardless of the implications for capital income tax rates. Unlike a Ramsey planner, at each date, sequential governments in a Markov-perfect equilibrium consider the past as sunk and, therefore, treat capital income taxes as non-distortional.

**Future Research on Optimal Fiscal Policy**

While the previous work extends our understanding of optimal public investment, the present framework abstracts from several features that are potentially interesting. The investigation in the latter paper focuses on two extremes, namely full commitment over the infinite future and no commitment. In practice, different institutional arrangements make it partially costly for governments to simply break past promises. Developing a framework that more closely captures political environments that limit the feasibility of policy change would represent a significant step towards practical policy analysis. Ultimately, we want to produce several testable hypotheses that we can test using cross-country data.