RESEARCH STATEMENT

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My research is focused on the effects of redistribution policies with an emphasis on Health Care reform and Pension reform. This research is important because inter-generational transfer systems have come under pressure due to demographic trends and increases in the price of health care and are in need of reform. My goal is to construct general equilibrium structural life-cycle models, estimate the model parameters (or a subset of parameters) and use the model to analyze policy reforms (e.g. privatization of social security, changes in retirement plans, introduction of private health savings accounts, changes in prescription drug benefits, etc.).

MACROECONOMICS OF HEALTH CARE REFORM

Issues concerning the health sector and health policy have significant macroeconomic implications on growth, equity, and welfare. The macroeconomics literature on health and health policies is still in its infancy. In contribution to that research area, I have been working on two papers so far.

In the first paper **(Job Market Paper)** *"The Macroeconomics of Health Savings Accounts"* (with Chung Tran), we analyze whether a consumer driven health care plan like the newly established Health Savings Accounts (HSAs) can reduce health care expenditures in the U.S. and increase the fraction of the population with health insurance. We use an overlapping generations model with health uncertainty and endogenous health care spending. Agents can choose between a low deductible- and a high deductible health insurance. If agents choose to purchase the high deductible health insurance, they are allowed to contribute tax free to an HSA. We examine the steady state effects of introducing HSAs into a system with private health insurance for young agents and Medicare for old agents. We focus on whether HSAs can decrease total health expenditures and whether they increase the number of insured workers. Since the model is a general equilibrium model, we fully account for feedback effects from the factor markets as well as from the insurance markets. This allows us to also investigate the effects on output and the distribution of wealth. Our results from numerical simulations indicate that HSAs decrease total health expenditures but increase the number of uninsured individuals. Furthermore, HSAs decrease the aggregate level of health capital and therefore decrease output. We also address possible extensions of the HSA reform that include the eligibility to pay health insurance premiums with HSA funds, the full privatization of Medicaid via HSAs, and Medicare for workers.

In the second paper *"Subjective Health Expectations,"* I construct subjective health expectations curves and empirically evaluate its components. Health status and health expectations play an important role in insurance choice decisions, along with institutional details about the eligibility of Medicare and other forms of health insurance. I am therefore interested in whether subjective health expectations can change the analysis of standard life-cycle models with health investment decisions under uncertainty about future health status. The literature has developed subjective mortality expectations curves that can be substituted for "objective" mortality curves that come directly from the mortality tables. These subjective expectations show some promise in improving estimation results of structural life cycle models. I expect to get similar improvements using subjective health expectations in a health uncertainty model with various insurance options. I therefore derive subjective health expectations curves using data from the Health and Retirement Study (HRS). This dataset focuses on the elderly population. In addition, I have found that (i) subjective health expectations do contain additional information that is not incorporated in subjective mortality expectations and (ii) that the rational expectations assumption cannot be rejected for subjective health expectations.

PUBLIC PENSION REFORM

The same demographic trends that make reform of Health Care insurance inevitable also threaten pension systems. The sustainability of pension systems has become an issue because of the decrease in retirement age and the pay-as-you-go structure of most pension systems in the world. "Early" retirement is very common in the industrialized economies and is well documented in the current literature. Such early retirement provisions can be very costly and threaten the sustainability of pension systems. Generous pensions for public sector workers are widely observed in many countries, which may have adverse effects on savings, labor market behavior, the allocation of labor, and the government budget. I have been working on several papers exploring the adverse effects of generous public sector pensions in Brazil.

In the first paper, *"Macroeconomic Implications of Early Retirement in the Public Sector: The Case of Brazil"* (with Gerhard Glomm and Chung Tran – revise and resubmit to the Journal of Economic Dynamics and Control, JEDC), we use an overlapping generations model with a government that hires civil servants and invests in a public capital, which produce a productive public good. Retirement among civil servants may occur endogenously at ages 50, 55, 60, or 65, depending on the design of the pension system. Upon early retirement, civil servants are free to pursue employment in the private sector. All government expenditures are financed by taxes on labor and on capital income. The government budget is assumed to be balanced in each period. We calibrate the model to data from Brazil and calculate steady state equilibria as well as transition paths between pre reform and post reform steady states. We find that decreasing the generosity of public sector pensions from levels where all civil servants retire at age 55 to levels where they retire at age 65 increases steady state private sector output by about 2% when capital tax rates adjust to clear the government budget and early retirees worked 40% of their time on average in the private sector. Effects of similar magnitude are obtained when the government adjusts the labor tax to clear the government budget. We find that the quantitative effects are robust to changes in the parameters.

The second paper, *"Public Pension Reform and Capital Formation: The Case of Brazil"* (with Gerhard Glomm, Changmin Lee, and Chung Tran – under revision), analyzes the opportunity cost of government spending on public pension programs. We find that cutting the generosity of public sector pension programs and shifting the funds to public education or investments in a public capital generates large effects on long-run incomes.

The third paper, *"On the Distributional Effects of Public Pension Reform via Inflation Channel: The Case of Brazil"* (with Gerhard Glomm and Chung Tran - preliminary), studies an additional channel of how public pension reform can affect the economy. Since inflation is a flat tax on money holdings, poor individuals are hit harder by this tax because they tend to hold more of their assets in terms of cash relative to capital. Therefore, reducing the government budget deficit by cutting the generosity of a public pension program would decrease the demand for seigniorage revenue. This is turn can lead to lower inflation taxes which would benefit the poor. This paper aims to quantify the effects of decreasing the generosity of public sector pensions on inflation and the distribution of wealth in a life cycle model with money and heterogeneous agents.

SOCIAL SECURITY AND REDISTRIBUTION

In "*The Extension of Social Security Coverage in Developing Countries*" (with Chung Tran), we investigate the dynamic effects of extending the coverage of social security to uncovered elderly individuals in the informal sector in developing countries. We focus on quantifying the effects on savings, bequests, inter-vivos transfer, labor supply, output, distribution of wealth and welfare. We use an overlapping generations model with two production sectors, heterogeneous agents, two-sided altruism, and stochastic sector mobility. Our calibrated model predicts that the introduction of a moderately sized social assistance program decreases capital stock by around 4.5% and

long-run income by 2%. However, in contrast to the previous literature which concentrates on social security in developed countries, the model predicts welfare gains. This result implies that in developing countries where there is a severe shortage of mechanisms against income and longevity risks, the insurance role of a social assistance program dominates the crowding-out effects.

In *"The Timing of Redistribution"* (under revision) I ask the simple question whether a redistribution program that targets older individuals can "dominate" a redistribution program that targets younger individuals in terms of output and some measure of welfare. In general, redistribution to the elderly has adverse savings effects that lower output in the long run, whereas redistribution to young agents, say in the form of education vouchers etc., does not necessarily decrease the savings rate. In this paper I assume that late redistribution can be targeted because information about the individual income path of an agent is available for constructing redistribution programs. I then derive a series of simple two-period OLG models with heterogeneous agents under five policy regimes: A laissez-faire (benchmark) model with no redistribution policy, two early redistribution (lump sum) regimes, and two late redistribution regimes. I assume that only the late redistribution regimes can target the recipients of transfers. Redistribution programs are financed by either a labor tax on the young or a savings tax on the old generation. I argue that late redistribution, if the programs are moderate in size, can dominate early redistribution in terms of welfare but not in terms of real output. Better targeting of low income households cannot offset savings distortions.

In *"Public Education versus Social Security"* (preliminary) I study the effects of allocating public funds between social security and public education in a 80-period OLG model with heterogeneous agents. Some agents acquire higher education and therefore have a shorter active work life but higher income levels. Agents pay payroll taxes according to a progressive formula in addition to a flat rate tax on capital. Old agents receive social security according to a realistic payout formula. I investigate the effects on steady state output and the distribution of wealth after shifting funds from social security to public education.

FUTURE RESEARCH

My future research will have a stronger empirical component than my past work as I plan to verify the computational results of the life cycle models described above. This will require structural estimation of dynamic general equilibrium models. Standard estimation techniques using the Nested Fixed Point Algorithm (NFXP, Rust (1987)) have been marred by computational complexity due to the required resolving of the equilibrium solution at each iteration step. Recent methods proposed by Aguirregabiria and Mira (Econometrica 2007) and Judd and Su (2007 – preliminary) sidestep the issue by using a nested Pseudo Maximum Likelihood estimator (NPL) and a direct optimization approach respectively. Both methods reduce the computational burden and allow for effective implementation of a Maximum Likelihood type estimator.

If data on HSAs becomes available (HSAs were introduced in 2003 and most major health insurance databases are issued with a 2-year lag), I would like to estimate the model and repeat the policy experiments conducted in *"The Macroeconomics of Health Savings Accounts."* In addition, I am interested to see whether the use of subjective health expectations (as derived in *"Subjective Health Expectations"*) can reduce the bias in the model predictions and lead to similar improvements as using subjective mortality expectations did in Gan, Gong, Hurd, and McFadden (2004).

Furthermore, I plan to use the health-savings-pension framework of the HSAs paper to study the effect of reverse mortgages for the elderly. The market for reverse mortgages in the United States is underdeveloped. I think that, in theory, a reverse mortgage should be a desirable refinancing instrument for the elderly,

especially since it appears that bequest motives will decline in importance as a determinant of elderly savings and consumption decisions in the future. The same model can be used to study the low take up rate of long term care insurance in the U.S. market.

Finally, the framework is also suitable to analyze the current AIDS crisis in developing countries. In this context I seek to model an aggregate policy shock which could be introduced in the form of the discontinuation of an aid program to fight AIDS. I am also interested to what extent the current AIDS crisis contributed to the observed decline in the savings rate for a host of African countries. Following the criticism in Easterly (2006) about the wrongful concentration on treatment in the current AIDS crisis in Africa, I am planning to work on a model that contrasts prevention vs. treatment in a model with a corrupt government and stochastic foreign aid influx. The goal is to map out an efficient portfolio for aid investments in developing countries.

In "*The Extension of Social Security Coverage in Developing Countries*" (with Chung Tran), we would like to extend the model to incorporate a dynamic game (so far we abstract from this and assume that parents and children are joint decision makers within a household) between parents and their children. We expect that strategic interactions within the household can have important effects that should be taken into account when modeling the extension of the social security program to informal sector workers. In addition, it will be crucial to include endogenous sector choice, since the extension of the social security system to the informal sector will potentially prevent workers to leave the informal sector. The latter effect could lead to an increase in the number of informal sector workers who do not contribute to the pension or social insurance program.

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