Conference Summary: Financing Human Capital Investment

January 5, 2012

Overview

The purpose of this conference was to bring together a diverse group of scholars to build links, facilitate discussions, and generate ideas on understanding the determinants and financing of human capital investment. Given the increasing costliness of human capital investment, important efficiency and equity questions arise as to the level and distribution of such investments in an economy.

The conference was structured around sessions led by the following papers:

- "The Money Value of a Man"
  Mark Huggett (Georgetown University) and Greg Kaplan (University of Pennsylvania)
  Discussion leader: Luca Benzoni (Federal Reserve Bank of Chicago)

- "Human Capital Risk, Contract Enforcement, and the Macroeconomy"
  Tom Krebs (University of Mannheim), Moritz Kuhn (University of Bonn), and Mark Wright (UCLA)
  Discussion leader: Matthias Doepke (Northwestern University)

- "Understanding the Income Gradient in College Attendance in Mexico: The Role of Heterogeneity in Expected Returns "
  Katja Kaufmann (Bocconi University)
  Discussion leader: Salvador Navarro (Western Ontario)

- "The Macroeconomics of Microfinance "
  Francisco Buera (UCLA), Joseph Kaboski (University of Notre Dame), and Yongseok Shin (Washington University, St. Louis)
  Discussion leader: Mark Wright (UCLA, Federal Reserve Bank of Chicago and NBER)

- "Equilibrium Effect of Education Policies: A Quantitative Evaluation"
  Giovanni Gallipoli (University of British Columbia), Costas Meghir (Yale University), and Giovanni Violante (New York University)
  Discussion leader: Mariacristina De Nardi (Federal Reserve Bank of Chicago and NBER)

- "The Production Function of Human Capital in Developing Countries"
  Orazio Attanasio (University College London)
  Discussion leader: James Heckman (University of Chicago)

I. The Money Value of a Man

The most valuable asset people hold is their own human capital. This paper explores two questions

- What are the properties of the value of an individual's human capital when viewed as an asset?

- What are the properties of the associated returns on the human capital asset?

The value of human capital is defined as the present value of future earnings, discounted using an individual's own stochastic discount factor. One's stochastic discount factor is defined as the ratio of marginal utility of consumption across time and turns out to be negatively correlated with risk, where risk is measured by the variance of uncertain individual earnings. Returns are calculated by future value plus dividends divided by current value, as the returns of any financial assets. These values are measured using US data on male earnings and financial asset returns. The data suggest that there is substantial persistence in earnings and that income risk is countercyclical.

Taking this model of human capital valuation to data yields the following main results:

- The value of human capital is hump-shaped over the life-cycle.

- The value of human capital is substantially below the present discounted value of future earnings, when the discounting is computed using the risk-free rate. This is due to the following two reasons:
    - Individuals face borrowing constraints.
    - Individuals are not perfectly insured against risk, especially early in life.

- Human capital returns decline with age and greatly exceed the return to stock early in life because future value of human capital greatly exceeds current value at that time.

- Human capital returns and stock returns have a small positive correlation over the working lifetime.

<u>Discussion</u>:

- The paper's finding is sensitive to assumptions about the stochastic processes for earnings and financial asset values. It is common to assume that there is an aggregate component and an idiosyncratic component of labor income. The aggregate component is typically related to what happens in the overall economy; one will therefore expect that cointegration between dividends on the aggregate market portfolio and aggregate labor

income, which is not assumed in the empirical analysis. Imposing cointegration can improve the model's empirical success in a number of ways. According to the baseline model in the paper, over the life cycle, the fraction of investments made in stock is relatively flat. In fact, the average holding of stocks is hump-shaped over the life cycle. If one assumes cointegration between aggregate dividends from the stock market portfolio and aggregate labor income, then one may be able to reproduce this empirically observed hump-shape average holding of stocks.

- Earnings here are assumed to be exogenous, which is of course not empirically valid. Therefore, it is worth-while to think more carefully about the production function of human capital and how human capital investment decisions depend on earnings. This is especially important when it is expensive to invest in education and people are likely to face borrowing constraints.

- Some professions seem to be subject to more aggregate risk than others. The portfolio holdings of different people vary depending on what types of shocks they face. It would be interesting to explore the implications of the value of human capital in terms of different professions.

- The theoretical model employed in the empirical work allows for uncertainty over the life-span. Depending on one's current health, one's life expectancy can vary significantly which would have large implications on the life-time present value of income and thus the value of human capital.

II. Human Capital Risk, Contract Enforcement, and the Macroeconomy

For many households, and especially young ones, human capital is the most important part of total wealth. This paper views human capital as an asset and explores the implications of the following three properties of the human capital asset:

- Human capital is risky; one may face health risks and labor market risks that affect one's labor income and hence human capital's valuation.

- The expected returns to human capital are heterogeneous; in particular, expectations of returns to human capital are different for young and old households.

- Human capital is not alienable; it cannot be used as collateral to borrow.

These properties of human capital imply an interesting risk-insurance relationship because young households are the most exposed to human capital risk, but they are also the least insured. Young households expect higher returns on human capital than older ones, so they choose to invest more. Therefore, they are more exposed to the risks involved. In an environment with complete markets and perfectly enforced contracts, they would borrow to perfectly insure these

risks. However, with limited contract enforcement, they are constrained in their borrowing and are underinsured relative to the perfect enforcement baseline.

The implications of the theory are assessed using data on holdings of life insurance as a measure of insurance against one of the largest human capital risks – the death of a family member. When the returns to human capital investment in the model are calibrated to match the age profile of earnings growth, the analysis finds that:

- The model matches the significant decrease in the fraction of wealth invested in human capital (as measured from the ratio of labor earnings to financial wealth) over the lifecycle;

- The model matches the extent to which insurance against the death of a family member, as measured by purchases of life insurance, increases over the life-cycle.

- The welfare costs of under-insured young households are substantial.

This paper suggests that a number of policy reforms would lead to a welfare-improving increase in insurance and human capital investment. Importantly,

- With default penalties for all borrowers, credit subsidies for young households would increase access to insurance against human capital risk.

- Modifying the bankruptcy code to allow garnishment of labor income would also increase insurance.

Discussion

- The results rely on the assumption that the return to human capital investment decreases with age. For tractability, the authors model returns to human capital investment as constant for a given age, but at rates that decrease with age. To what extent is this assumption restrictive? Does labor market risk vary directly with the level of human capital independently of age? On the one hand, the probability of becoming unemploymed is larger for people with less education. Moreover, health insurance in the US is often tied to employment. This suggests that less educated people are more vulnerable to unemployment risk and might be more exposed to health shocks due to the lack of health insurance. On the other hand, the size of the income loss from unemployment is larger for people with more education, and empirically there is no simple, monotone relationship between labor market risk and education.

- The paper focuses on the inalienability of human capital and the resulting limitations of commitment as the source of market failure. Other forms of market failures due to, for example, moral hazard, may also be important. The paper focuses on insurance against the death of a family member where moral hazard considerations are arguably less important than limited commitment. For other forms of risk, moral hazard may be more important. It

would be interesting to extend the model to include other frictions, and to assess whether different policy reforms are warranted.

- After WWII, high taxes were levied in the US and very substantial education grants were given to students. In essence, this policy was designed to address the inability of young people to acquire human capital because they did not have the access to credit. The society at large provided money needed for human capital investment. Economic growth was impressive during that period of time. In recent years, such societal grants are much more limited; borrowing and lending for human capital investment are provided through the private sector. It would be interesting to extend the analysis to consider trade-offs between public and private provision of finance for human capital investment.

III. Understanding the Income Gradient in College Attendance in Mexico: The Role of Heterogeneity in Expected Returns

Countries in Latin America are characterized by relatively low levels of human capital investments compared to countries with similar per capita incomes. The region is characterized by massive inequality between poor and rich in terms of education attainment, earnings, and wealth. In Mexico, for example, an adolescent from a family of the highest quintile of the income distribution is eight times more likely to attend college than one from a family in the lowest quintile. In recent decades, the returns of attending college have been rising, but college attendance by children of the poor has not responded to this change. This paper attempts to answer the following questions:

- What are the underlying mechanisms determining the correlation between parental income and college attendance?

- What types of policy reforms would lead to high college enrollment of the poor and would be welfare improving?

There are two possible explanations for low college attendance rates among the poor. First, the poor may not be able to attend college due to financial reasons. There is a limited number of student loans and fellowships available. In addition, access to the credit market by poor families is limited due to the lack of collateral. Second, the poor may not want to attend college, because they expect low returns from attendance. They may be poorly informed about career possibilities with a college degree, underestimating the returns to college. This would imply that the decision not to attend could be inefficient. This paper tries to distinguish between these two explanations as they differ substantially in terms of policy implications.

The empirical results of this paper show that:

- Subjective expectations of returns to schooling help to predict schooling decisions, but they are not able to explain the large differences in enrollment rates between poor and rich children.

- Children from poor families require significantly higher expected returns to be induced to attend college than children from affluent ones.

- Children from poor families who have high expected returns to college are particularly sensitive to changes in direct costs of schooling, consistent with credit constraints playing an important role in college enrollment decisions of the poor.

- Counterfactual policy experiments show that a significant fraction of students could be induced to attend. A 10% reduction in tuition costs leads to a 1.5% increase in college attendance among the poor.

Overall, the low college enrollment rates among poor Mexicans are not driven by low expected returns, since a sizeable fraction of individuals with high expected returns are not attending college. Evidence suggests that credit constraints play an important role in college enrollment decisions. Therefore, policies such as student loans and fellowships could increase the poor's access to college and could potentially lead to important welfare improvements.

Discussion

- How well does the expected returns to college reflect people's actual earnings if they had attended college? Is it possible that the poor overestimate their future expected college earnings?

  A: The data shows that expected returns are increasing with GPA, which is positively correlated with actual earnings.

- If we can elicit expectations, why can't we elicit preferences from "carefully" worded questions?
- It would be useful to consider the underlying reasons for constraints on student borrowing in Mexico. If lenders cannot tell whether poor children have high or low returns, then it is difficult to convince them to lend to the poor even if some poor children knew they would be successful.

IV. The Macroeconomics of Microfinance

Microfinance represents credit targeted toward small-scale entrepreneurial activities, consumption smoothing, and human capital investment by the poor, who may otherwise lack access to financing. It has become a pillar of economic development policy. Microfinance has been growing at a fast rate, up to 29 percent a year. For a significant number of developing countries, microfinance loans amounts to close to 10 percent of GDP and affect over 10 percent of the population.

There has been a concerted effort to expand these programs with the goal of alleviating poverty and promoting economic development. However, the macroeconomic effects of economy-wide microfinance have not been explored. This paper attempts to fill this gap by providing a quantitative assessment of the potential impact of economy-wide microfinance availability. This paper studies the general equilibrium effects of microfinance on development.

Previous studies find that in partial equilibrium, microfinance

- Increases total factor productivity (TFP) by allowing entrepreneurs with high marginal product of capital to invest more.
- Redistributes income from talented, high savings individuals to the less-talented, low saving ones as more entrepreneurs compete for workers
- Depresses capital accumulation.

In general equilibrium, microfinance increases the welfare and consumption of some individuals, but it has little impact on aggregate output and consumption.

Discussion

- How does this paper relate to papers which have found that microfinance can lower wages and reduce the welfare of the poor?

- This paper assumes that microfinance is an innovation that allows borrowing without any risk of default or intermediation costs. Neither assumption seems empirically valid.

- Human capital accumulation is not considered in this paper. However, many believe that microfinance is important for development as it gives the opportunity for the poor to educate themselves.

- For some regions in developing countries, there is strong market segmentation in credit. One primary benefit of making microfinance more widely available is that it increases the competition in the credit market and reduces the ability that lenders have to extract rents and distort interest rates. This may lead to stronger welfare effects.

- People who borrow through microfinance programs may use the money to buy intermediate inputs or hire labor. Since the output elasticity of these factors of production is much higher than the output elasticity of capital, incorporating this may also lead to a much larger effect on output.

- In the empirical analysis, what is the main difference in the underlying distribution of entrepreneurial ability by moving from US data to Indian data?

  A: The dispersion of productivity is reduced by 10-15%.

V. Equilibrium Effects of Education Policies: A Quantitative Evaluation

To evaluate education policies, it is important to investigate the interaction between within family inter-vivos transfer and economy-wide educational policies. This paper examines policies that are designed to alter the equilibrium distribution of education and explores the economic consequences of this redistribution. The implications for education choices are studied, along with the role of those decisions in shaping life-cycle earnings and wealth profiles.

This paper builds a life-cycle model with endogenous labor supply, consumption and education choices, allowing for agents' heterogeneity and for imperfect credit and insurance markets. The model internalizes the dynamic life-cycle effects of access to family resources by allowing altruistic parents to make voluntary inter-vivos transfers to their children at the beginning of their children's independent life. The model is then used to evaluate education policies such as tuition subsidies.

This paper shows that

- Policy outcomes are sensitive to small changes in marginal returns of education.

- In partial equilibrium, policies such as conditional grant and loan subsidies are effective in substantially increasing education and mildly reducing inequality.

- Partial equilibrium effects on average education outcomes largely disappear in general equilibrium, because subsidies crowd out inter-vivos transfers in equilibrium and are associated with more sorting and inequality.

<u>Discussion</u>

- This research has incorporated several important ingredients and therefore can potentially explore many different aspects of the equilibrium effects of education policies:
    - Endogenous labor supply;
    - Agent's heterogeneity (permanent ability and uninsurable efficiency shocks);
    - Transmission of ability across generations
    - Inter-vivos transfers from parents to children to ease liquidity constraints for education decisions.

- This paper incorporates several market imperfections: borrowing constraints, labor market risk, and the lack of insurance against child ability. Which market imperfections are the most important?

- We may be able to use a simplified version of this model to consider what happens when:

- The cost of education increases;
- A credit crisis occurs;
- The labor market is stagnant;
- Demographic changes occur.

- The paper concludes that the least educated are hurt by the education policies that include grants and loans. Inequality is transmitted inter-generationally. Are the least educated worse off in an absolute sense or a relative sense? What is the implication in terms of policy advice?

  A: This paper offers ways to evaluate policies. Currently, we consider a very simple policy -- a universal subsidy -- and show that in equilibrium it might, in some circumstances, lead to welfare losses among the least educated. However, this form of education subsidy does not well-represent actual financial aid policies. For example, in the UK, there are income-contingent repayment loans. Fortunately, it is possible to use this model to think about designing policies that better target low-skilled individuals to improve their human capital investment.

VI. The Production Function of Human Capital and Parental Investment: Evidence from a Panel Study of Bangladeshi Children

Previous work on early childhood development has shown that a child's early human capital acquisition is likely to have profound economic and social implications well into the child's adulthood. Brain development occurs during the early years of life, and the accumulation of human capital is highly persistent. Therefore, it is important to explore policy interventions that affect outcomes in the early years.

Human capital can be viewed as a combination of one's cognitive skills, non-cognitive skills, and health. It is important to consider what enters the production function of human capital. Many studies have suggested that family environment plays an important role in one's development of human capital. Here, family environment includes the following inputs: parents' health, IQ, and education; the quality of parenting; the human capital investment decision; and the financial situation of the family. In addition, recent studies have shown that different combinations of nutritional supplements can also have different outcomes for young children.

The development of human capital is a very complex process that is affected by a wide range of inputs; and these inputs can also lead to different outcomes depending on the timing as to when they are received. Therefore, it is important to consider the dynamic formation of human capital.

This paper models human capital accumulation over time and addresses the following questions:

- What are the inputs into the production function of human capital?
- What are the determinants of the level of human capital over time?
- What are the child investment behaviors of households, and what constraints do they face?
- What are the appropriate policy interventions to implement?

The empirical results show that

- Health plays an important role in a child's development of cognitive and non-cognitive skills.
- Mother's IQ becomes increasingly important as the child ages.
- Father's education, which is a measure of the family's wealth, is positively correlated with a child's development of human capital.
- There is strong persistence over time for children's development of cognitive skills, non-cognitive skills, and health.

Discussion

- This paper assumes a linear technology; recent research suggests that it would be useful to consider a nonlinear technology to explore richer intertemporal trade-offs.
- It would be interesting to examine the neuroscience literature on the development of brain plasticity. We know that there are certain periods in development in which there is substantial neuron death for example. Perhaps one should focus on the investments prior to these events. More generally, there are certain points of time when interventions may be particularly effective. The neuroscience literature can provide guidance on timing relationships.