

Inter-generational Income Sharing and Schooling Investments

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Abstract

This paper undertakes a theoretical and empirical analysis of the hypothesis that the value of the inter-generational family unit in smoothing life cycle consumption affects the schooling decisions which parents make in their children. The theoretical analysis of this paper shows that the effects of schooling depend on assumptions regarding income-age profiles, commitment to the contract, and the availability of a storage good. Under a certain set of assumptions, parental dependence on children for old-age consumption support will reduce the schooling of both boys and girls. This suggests an alternative explanation for the observed positive effect of economic growth on schooling, through the negative effect of growth on the relative profitability of the family contract. The empirical analysis uses a 1996 cross-section of data on Indian urban and rural households to show that parental dependence on children does, indeed, reduce schooling investments in children.

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1 Introduction

“There is...an interesting question of why the demand for the schooling of children exists, given that it destroys a family structure of which the older generation has always approved and a family economy that brought them benefits in proportion to the number of children they had (Caldwell 1980).”

This paper examines how inter-generational income sharing arrangements between parents and their children affect the schooling of children. Income sharing arrangements between parents and their sons are widespread in many developing economies, particularly where credit markets are imperfectly developed. In these economies, implicit credit contracts across generations provide the primary means of smoothing consumption over the life cycle for many households.

A growing body of theoretical and empirical work recognizes that the terms of this implicit credit contract are not altruistically motivated but reflect the relative incomes of parents and their children. For example, studies of village India note the common belief that the probability of a son supporting his parents falls with his schooling, but even more so with the schooling of his wife. Indeed, it is widely believed that relatively well educated daughters-in-law are the primary source of disruption in traditional family economic relations. One would expect, then, that these costs to schooling would influence parents' decisions regarding the schooling of their sons. And, in economies such as India's where the overwhelming majority of marriages are still arranged by parents, such costs should similarly reduce parents' demands for an educated daughter-in-law. This should, in turn, discourage parents' investments in their daughters' schooling.

This paper analyzes these issues, both theoretically and empirically. On the theoretical side, it extends Lambertini's (1998) model of consumption loans between overlapping generations with

enforcement constraints to analyze the effect of the inter-generational loan contract on the investments parents make in their children's schooling. It does so under two scenarios. The first assumes that, as in Lambertini's model, individuals have no alternative means of smoothing consumption. The second scenario relaxes this assumption, allowing for a "storage" option in the form of an alternative asset which enables households to save income for later consumption.

The analysis of this paper shows that the effect of an inter-generational loan contract on schooling depends on the effect of schooling on income profiles, on the ability to commit to the contract and on the availability of a 'storage' option. For example, under the assumption that schooling makes income even more 'hump shaped' by increasing incomes the most in peak earning years, the inter-generational contract causes greater parental investment in sons' schooling if no alternative form of saving is available. This result is reversed if a storage good is available; increased schooling then increases the probability that sons will default on the inter-generational loan contract and hence reduces the interest rate parents earn on these loans. This reduction increases the costs of schooling children and, therefore, reduces schooling in households where parents are dependent on children for old-age support.

Because of the patriarchal nature of Indian society, any market or non-market returns from the schooling of women benefit parents-in-law more than they do parents. These returns do, however, influence the investments parents make in their daughters' schooling, because they are priced in the market through the dowry system. Since participation by South Asian women in the wage labor market is limited, many have argued that, in these economies, the returns to women's schooling accrue primarily in the home-production sector. The analysis of this paper shows that if female schooling complements the use of market inputs in home production, then parents lower the

returns they receive from loans to their sons by arranging his marriage to a more educated bride. This negative correlation between female schooling and interest rates persists even if alternative forms of savings are available.

Economic growth is generally accompanied by the development of credit markets and an increase in the availability of financial assets which facilitate saving. Given this, the conclusion that their availability increases schooling costs suggests a *negative* correlation between growth and schooling, a correlation which would counteract the otherwise positive effects of economic growth on schooling, through incomes, and through the rate of return on schooling.

This conclusion holds, however, only for individual households, and not for the population as a whole. While the growth of financial markets may increase schooling costs, it does so only for parents who are dependent on their children for old-age support. Economic growth may also reduce the economic value of the family unit and hence the proportion of parents who are dependent on their children. If the higher cost of schooling incurred by dependent parents results in lower average levels of schooling for their children, this growth-induced reduction in the proportion of dependent households will increase average levels of schooling in the economy.

This effect of economic growth on aggregate schooling through its effect on the relative profitability of the family contract provides an alternative explanation for the observed positive effect of economic growth on aggregate levels of schooling in the economy. Unlike others, this explanation links current schooling to expectations of *future* income growth, even in economies where credit markets are imperfectly developed. If parental dependence on children affects the schooling of girls more than it does that of boys, growth-induced reductions in parental dependence can also explain the reduction in the gender gap in schooling which accompanies economic growth.

The empirical analysis of this paper takes these hypotheses to the data, using household data from a 1995-96 cross-section of urban and rural Indian households collected by the Government's National Sample Survey Organization (NSSO). Levels of schooling in India are low, even by the standards of developing economies. However, the past few decades have witnessed a significant improvement both in schooling levels, and in the gender gap in schooling. By 1995-96, 74% of urban boys between the ages of 15 and 20 had completed middle school, a significant increase from the 68% of boys in the same age group with middle schooling in 1986. The corresponding percentage for urban girls between the ages of 15 and 20 was 71% in 1995 and 58% in 1986. The more rapid increase in the schooling of girls significantly narrowed the gender gap.

While other researchers have noted that economic growth affects schooling through incomes and rates of return, there are no empirical studies which examine whether growth also affects schooling through its effect on the family unit. This may, perhaps, reflect the widespread belief that institutional change occurs only slowly, so it cannot explain increases in schooling which occur over the course of a decade. Such beliefs are supported by the considerable stability in residential arrangements in the Indian economy; approximately 80% of individuals over the age of 60 report living with their children, a percentage which shows remarkably little change across the years.

However, data on the extent of inter-generational co-residence provide little information on the prevalence and extent of income sharing arrangements within the family. And, available data suggest that there have been significant changes in such arrangements. For example, the NSS survey asked elderly parents if they were dependent on their children. In 1996, only 32% of the elderly claimed to be either fully or partially dependent on their children for financial support, down from 38% in 1986.

The empirical analysis of this paper uses this indicator variable to analyze the determinants of expectations regarding parental dependence on children and, subsequently, the effect of these expectations on the schooling of children. In the first set of regressions reported in this paper, I identify the effect of expected parental dependence on schooling using information on financial infrastructure at the time schooling decisions were being made, and the proportion of parents dependent on children in earlier generations. The results show that parental dependence on children reduces the schooling of boys and, even more so, that of girls.

These results can be questioned on several grounds. Foremost, there is the concern that we do not have good retrospective data on the economic situation of these households at the time when schooling decisions were actually being made; lagged measures of infrastructure and parental dependence may merely be proxying for unobserved household income in an earlier period when parents were schooling their children. Because regressions are based on a selected sample of households in which adult children reside with elderly parents, the results may also be biased because of the non-random probability of survival as well as the endogenous decision on co-residence.

I address these concerns by examining the determinants of schooling in a second randomly selected sample of “young” households, households whose heads are less than 50 years of age and who are *currently* schooling their children. I do so by using the estimates of the determinants of parental dependence obtained from the elderly sample to make out-of-sample predictions of the probability of currently young parents being dependent, in their old age, on their children. A second stage regression then examines the effect of expected parental dependence on schooling outcomes currently being made, controlling for current household wealth.

In addition to addressing concerns resulting from selection bias, this methodology has two principal advantages. First, it enables good controls for current household income, minimizing concerns that the measure of dependence merely reflects unobserved household wealth. Second, it provides an additional instrument for further mitigating concerns about the endogeneity of parental dependence. Specifically, using wage data from successive rounds of employment surveys, I estimate wage growth, by education level, region and expenditure quartile, which the current elderly experienced in their prime-earning period, between the (average) ages of 50 and 60. Income earned in prime-age periods is undoubtedly an important determinant of old-age dependence on children and, correspondingly, expectations of prime-age earnings can be expected to influence expectations of old-age dependence. But, because expectations of future income are not a component of current income, they should have little direct effect on the current consumption of young households. Put differently, expectations of future income will affect current consumptions only through the terms of credit contracts. In the absence of alternative sources of long-term borrowing, the only available credit source for this purpose is the inter-generational contract between parent and child.

The second stage regression therefore uses expectations of future wage growth to identify the effect of expected parental dependence on schooling, measuring expected wage growth by matching observed wage growth between the ages of 50 and 60 to young household heads (less than 50 years in age) on the basis of education, regions and expenditure quartile. The results confirm the hypothesis that expectations regarding future wage growth do affect current schooling decisions, and that they do so primarily through their effect on the inter-generational loan contract. They also confirm that expectations of dependence reduce the schooling investments parents made in their children.

Because future earnings are predicted on the basis of schooling-region-age groupings, the results are subject to the criticism that they merely identify a non-linear relationship between parents and children's schooling. Alternatively, they may reflect a correlation between future earnings and current earnings, and a non-linear relationship between earnings and schooling. The last set of empirical results tests these alternative explanations. The evidence suggests that we do have a good measure of *expected* earnings, and, consequently, a valid instrument for expected dependence on children.

This research is related to several literatures, most obviously to research on the determinants of schooling, on the relationship between economic growth and schooling, and on the family and social networks. Other researchers have previously argued that the patriarchal nature of South Asian families explains the gender gap in socio-economic outcomes; because sons remain with parents and provide income support to them, parents are willing to invest in their sons, but not in daughters who leave their parent's home to settle in that of their in-laws (Dyson and Moore 1983). While this literature explains the existence of a gender gap in schooling, it cannot explain historically low levels of schooling, or the relationship between schooling and income growth. Additionally, it neglects any discussion of enforcement, implicitly assuming that the enforcement of the implicit contract between parents and sons is not an issue. The analysis of this paper shows that an explanation of the correlations between schooling and economic growth requires attention to the probability of default, a probability which exists even in intra-household contracts. It is the availability of outside options and the accompanying increase in the probability of default which generates the costs of schooling boys emphasized in this paper.

A related literature on intra-household allocations does not assume altruistic income sharing,

but allows individual consumptions to be influenced by the bargaining weight assigned to the utility of any given household member, weights which are assumed to vary with individual incomes and assets. Typically, bargaining weights are determined outside the model; they do not constitute a choice variable for household members. Individuals, however, frequently *do* have the opportunity to choose the partners they transact with, and hence can exercise some control over the terms of income sharing contracts. This is particularly true in the context of this study, where parents determine their sons' schooling and choose amongst daughters in law on the basis of characteristics which include schooling.

By viewing family members of different generations as constituting an internal credit market, this paper endogenizes the bargaining weights which determine inter-generational allocations. Welfare theory tells us that the weights in a social welfare function are the reciprocals of the marginal utilities of income. When the household constitutes a closed credit market, household interest rates are endogenous and also reflect the marginal utilities of income. Thus, interest rates represent (endogenous) bargaining weights; an increase in the interest rate on loans from parents to sons implies a greater share of total household income for the father. Working with interest rates rather than bargaining weights is useful, since we can analyze the effect of income earned in different periods on intra-household consumptions by drawing on a very intuitive set of comparative static results for how interest rates vary with income earned in different periods.

A final contribution of this paper is to the literature on social networks. Many have argued that membership in social networks, including the family, provides a substitute for absent or imperfectly functioning credit and insurance markets. While it is also recognized that participation in such networks may come at a cost, there are few studies which investigate what these cost are, or

their magnitude. My research shows that family networks maintain their economic value at a significant cost: lower schooling of subsequent generations. This is a social cost which many economies can ill-afford to bear.

The rest of this paper is structured as follows. Section 2 describes the data and the setting, while the theoretical model is specified in Section 3. Section 4 discusses the empirical methodology. Section 5 provides the main empirical results. Section 6 discusses and tests alternative interpretations of the results. Section 7 concludes.

2 Theoretical Framework

If children provide old-age support for their parents, one would expect the level of such support to vary with their incomes and hence with their schooling. The theoretical analysis of this paper shows, however, that the effect of schooling on the terms of any inter-generational loan contract between parents and children is ambiguous; it depends on the effect of schooling on incomes and consumption, on the ability to commit to the loan contract, and on the availability of alternative ‘storage’ assets which provide a means of transferring income from one period to the next. While one may expect the schooling of children to increase with parental dependence, the analysis of this section shows that, under some assumptions, sons’ schooling may very well reduce the interest rate on the inter-generational loan contract and hence the support which parents get from children. The same is true for daughters-in-law.

I assume that the household constitutes an internal credit market, with the demand for credit being generated by one generation and the supply of credit by another. If individuals always bargain to an efficient outcome, exploiting all gains from trade, then equilibrium outcomes can be derived

as the solution to a standard principal-agent problem, whereby the principal chooses the loan amount (or transfer) in successive periods subject to a participation constraint for both principal and agent, any incentive compatibility constraints, and a feasibility constraint which requires total consumption of all household members in any given period to equal total household income. As is well known, the solution to this problem corresponds to the competitive solution, whereby individuals solve for the demand for, and supply of, credit, taking interest rates as given, with equilibrium interest rates being determined by a market clearing condition.¹ Equilibrium interest rates correspond to the pareto weights in the principal-agent framework.²

Despite this equivalency, modeling outcomes within the competitive framework has several advantages. One is that it emphasizes the “investment” aspect of the schooling; as will become clear, the benefits parents derive from the schooling of their children accrue through the effect of schooling on interest rates. This feature of the model lends itself well to interpreting the decline of the family unit as a consequence of the change in the rate of return on the family contract relative to that earned on other assets. A second advantage is that this framework provides a very intuitive means of analyzing the effect of income changes on the distribution of income within the household. Because

¹If, instead, individuals allowed for the effect of loan amounts on interest rates, the optimal loan amount would be less than obtained in the competitive solution, and the marginal rate of substitution between consumption at different time periods would not be equated across borrowers and lenders. This difference implies that individuals would benefit from trade, until they reach the competitive solution when all gains from trade are exploited.

²Alternatively, if loan amounts are derived by maximizing a household social welfare function, competitive interest rates are equivalent to the bargaining weights in the social welfare problem.

interest rates reflect bargaining weights, these distributional results are given by the effect of income on interest rates. Finally, the overlapping generation framework I adopt facilitates an analysis of the effect of income earned in different life cycle stages on interest rates. I subsequently use these results for identification of the empirical model.

I use an overlapping generations model, drawing substantially on previous work by Lambertini (1998) but extending it by allowing for a “storage” option and by considering the effect of the parent-child contract on schooling investments. Consider, then, a pure exchange overlapping generations economy, where individuals live three adult periods: young adulthood, a period of middle age, and old age. As soon as children become adults (i.e., in the first adult period), they make their own independent consumption decisions, even though they may continue to reside with their elderly parents. Income is ‘hump’ shaped over the life cycle; it is low in young adulthood and in old age, and peaks when an individual is middle aged. Consumption requirements are highest in the first period of adulthood, when young adults are raising their own children and investing in their children’s human capital.

Because of the difference between consumption and income profiles, individuals would like to borrow in young adulthood and to lend when middle-aged, so as to smooth consumption over the life cycle. I explore two models. In the first, I assume that the only means of smoothing consumption over the life cycle is through an inter-generational loan contract between parents and their children. The second model relaxes this assumption, allowing for a “storage” good which provides an alternative method of transferring income across periods. In both cases, I assume that default is possible. Thus, the contract must be designed so that individuals have an incentive to uphold them.

2.1 Inter-generational Loan Contracts without Storage

The simplest model, in which enforcement is not an issue and when there is no alternative to the inter-generational loan contract, is fully specified in Lambertini (1998). Instead of this model, the starting point for the analysis of this paper is the model where commitment to the contract is not possible and default is an issue; parents do not always get the support they expect from their children (Dharmalingam 1990).

Let c be private consumption, β be the subjective discount factor, and let q_t represent the cost of a unit investment in schooling (h). Additionally, let R_{t+1} be the gross yield on loan b_{t+1} , $R_{t+1} = (1+r_{t+1})$, where r is the interest rate. Let superscripts index generations while sub-scripts index the stage of the individual's life cycle. Assuming that an individual's utility function is separable in consumption and the schooling of his children, a generation t individual (one who reaches adulthood in period t) maximizes the following utility function when young:

(1)