The Incidence of Public Services and Subsidies in Peru

Evidence from Household Surveys

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INTRODUCTION

One of the functions that people routinely expect governments to perform is to reduce inequality and poverty. This goal sits somewhat uncomfortably beside the more traditional concerns among economists for economic efficiency, including the provision of public goods. But it is important politically and socially, perhaps more so than issues of economic efficiency. Even the most neo-classical policymaker must heed a policy's consequences for the poor. To that end, this paper begins to examine the redistributive effect of social sector expenditures in Peru, with emphasis on comparisons between different services, i.e., which are more redistributive, and across time, i.e. which have become more progressive in recent years.

The transfer payments schemes that account for much of the government's redistributive policies in richer economies are quite limited in Peru. Instead, most ostensibly pro-poor expenditure is limited to social services, especially health, education, and a variety of food programs. Fortunately, these are also the expenditures that people most commonly expect to have a redistributive impact in developing countries, and they are generally covered in the household surveys that I use. So my focus is on expenditures for public health and education services, augmented where possible by information on other social sector programs that might redistribute welfare to the poor.

The thrust of the OECD project of which this paper is a part is to examine how we can use extensions of traditional benefit incidence methods to understand the impact of public expenditures on the poor. As with all the contributions, this paper includes a traditional benefit incidence study, which I then extend in several ways. First, I consider more detailed items in the government's budget. A typical benefit incidence study will consider the distributional impact of public expenditure on education, usually disaggregated by level (primary, secondary, etc.), and health, sometimes disaggregated by type of provider (hospital vs. clinic). Each of these items is broad, including many types of expenditure. As I discuss further in the methods section, the traditional benefit incidence method is accurate only if the benefits of a small change in public expenditures are proportional to the benefits of existing expenditures. For such broad expenditure categories, it is unlikely that a marginal expenditure will have this property. Rather, the extra expenditure may well go to a particular item in the budget, and the distribution of benefits for that item may be quite different than the distribution of all education spending. The data that I use in this study, discussed below, provide information not just on school attendance or use of health facilities, but also specific characteristics of those institutions. Even though the method remains the traditional one, the data permit me to examine finer detail in the expenditure incidence in the health and education sectors. For example, I can consider the incidence of text book distribution, piped water connections for schools, school feeding programs, having toilet facilities in health clinics, etc.

A second extension is to examine the correlation between a program's size and the distribution of its benefits. It is plausible to suppose in many instances, that if program beneficiaries are limited to a small group, most of them will be the well-connected, and probably better-off. But if the program grows, the marginal beneficiaries will be increasingly less well-off. Lanjouw and Ravallion (1998) call this "early capture" of program benefits by the rich. Alternatively, a program may be designed explicitly to benefit the poorest, in which case the early capture would be by the poor, with marginal beneficiaries increasingly well-off as the

program grows. Lanjouw and Ravallion (1998) present a method for examining this question in a single cross-section, and Lanjouw, Pradhan, Saadah, Sayed, and Sparrow (this volume) consider the same issue with a panel of households. In this paper, I use a series of cross-sections to examine the same question, by calculating the correlation between program size and the concentration of its benefits.

The third extension considers an alternative approach to the issue of "marginal vs. average" benefits. Using cross-section surveys at two points in time, I calculate the overall change in benefits for a program and then consider each quantile's share in that change.[1] This provides an estimate of the concentration of marginal benefits, where the margin is how the program expanded or contracted between the two surveys.

The fourth extension of the paper is to calculate the benefits of social programs on the basis of households' observed willingness to pay for the services received. In particular, I estimate discrete choice demand functions for public schooling in rural areas of Peru, and use the compensating variations associated with a cost change to value the service to public school students. I compare these results to the traditional ones, and also use them to estimate the impact of these transfers on poverty.

Finally a recent interest in the incidence literature has been the calculation of external benefits of public expenditure. In most cases, these are impossible to calculate, but some effects, particularly the impact of parents' receipt of public services (especially education) on their children's welfare, are estimable. In this paper, I estimate the impact of parents' educational attainment on their children's nutritional status.

The data for this study come from two different sources. The first is the *Encuesta Nacional de Hogares*, carried out by the *Instituto Nacional de Estadística e Informática* (INEI). This is a nationally representative, quarterly household survey, with each quarter's survey focusing on a different theme. In this paper, I use the survey from the second quarter of 1998, which focused on social services.

My second source is the four *Encuesta Nacional de Hogares sobre Medición de Niveles de Vida* (ENNIV), for 1985/6, 1991, 1994, and 1997. These surveys are also nationally representative, with some variation due to terrorism in 1985 and 1991. They have smaller sample sizes than the ENAHO surveys, and less information on social services. But they have the important advantage of providing intertemporal comparisons. These four surveys are quite similar in structure, permitting reasonable comparisons of social services over time. They also include information on incomes, expenditure, and use of public social services, whereas the ENAHO survey excludes expenditure information.

For a given survey, I examine the coverage of various public social services, i.e. the extent to which the programs reach their target populations. I also examine the incidence of any subsidies associated with these services. That is, I identify who benefits from the various categories of services, and I use dominance tests to compare the concentration of benefits for the services relative to each other and to two benchmarks: the Lorenz curve for expenditure inequality and the 45-degree line. Most of the emphasis in this section is on the ENAHO data. I then turn to the question of intertemporal comparisons, where I rely on the ENNIV data. Here, I

[1] Francois Bourgignon suggested this approach in his comments on an earlier draft.

compare the distributions of benefits from the same service at different points in time. In all cases, the comparisons are statistical, using a quite general covariance estimator due to Davidson and Duclos (1997).

SETTING THE CONTEXT

A BRIEF POVERTY PROFILE

There are many published poverty profiles for Peru that make use of the same data as this study.[2] As such, there is little need to repeat them here. Instead, I will give only a brief sketch of poverty in Peru, which is in most respects similar to what we have come to expect in developing countries. I use data from the 1997 ENNIV survey because it includes both expenditure and child anthropometrics information. Table 1 shows poverty headcounts for Peru, and its rural and urban areas. The first poverty line is local, based on the cost of a standard food basket plus a share of non-food expenditures determined around the poverty line.[3] The second is "international," set at two US dollars per person per month. As it turns out, this is very close to the local poverty line, so that the poverty measures are quite similar. 48 percent of all Peruvians are poor, with rural headcounts being much higher than urban, 70 percent vs. 35 percent, as is typical (Table 1).

Table 1 shows that poverty is correlated with adults' education levels. 66 percent of illiterate adults are poor in Peru, vs. 40 percent of literate adults. 64 percent of adults who have not graduated from primary school are poor, while 36 percent of primary graduates (or higher) fall below the poverty line. Only 22 percent of secondary school graduates (or higher) are poor.

Table 1 gives poverty rates for children in Peru. In general, children are poorer than adults, with 61 percent falling below the poverty line. The table also shows a correlation between stunting, that is, abnormally low height-for-age, and poverty. A typical cutoff for stunting is –2 standard deviations from the mean of a healthy population (-2 z-scores). Using this criterion, 84 percent of stunted children are poor, against 54 percent for children who are not stunted. Surprisingly, however, poverty rates are lower for wasted children, i.e. those with low weight-for-height. This may be a statistical aberration, however, as very few children in the sample are wasted.[4]

One less-common aspect of poverty in Peru is its correlation with ethnicity. For households where at least one member declares an indigenous language as his/her mother tongue, poverty is 69 percent, while for other households the rate is only 46 percent (Table 1).

In sum, poor households in Peru are more likely to be rural and indigenous. Their adult members are less likely to be educated. And their children are more likely to be stunted. Further information about the poor's use of social services, which is a main theme of this paper, follows.

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[2] Recent useful contributions include World Bank (1999), INEI (1997), and Escobal, Saavedra, and Torero (1998).
[3] See World Bank (1999) for details.
[4] This is characteristic of most nutritional surveys in Peru: wasting tends to be rare, usually affecting less than 5 percent of the population, while stunting is quite common, often affecting nearly half of all children.

Table 1 - Poverty head counts and decile distribution for Peru

	Poverty headcount		Poverty headcount by per capita expenditure decile									
	Local	$2	1	2	3	4	5	6	7	8	9	10
By Area of Residence												
Rural	0.703	0.699	0.216	0.170	0.152	0.132	0.095	0.074	0.061	0.052	0.032	0.017
Urban	0.350	0.345	0.074	0.075	0.082	0.086	0.100	0.110	0.113	0.111	0.123	0.126
National	**0.486**	**0.482**										
By education, adults only												
Illiterate	0.655	0.652	0.214	0.157	0.124	0.125	0.096	0.084	0.057	0.067	0.045	0.031
Literate	0.401	0.397	0.088	0.088	0.099	0.096	0.097	0.099	0.105	0.104	0.109	0.116
Non-primary grad	0.639	0.635	0.196	0.144	0.139	0.125	0.096	0.080	0.063	0.076	0.050	0.030
Primary grad	0.364	0.360	0.072	0.080	0.091	0.091	0.097	0.103	0.111	0.108	0.118	0.130
Non-secondary grad	0.555	0.551	0.144	0.131	0.123	0.123	0.099	0.101	0.084	0.084	0.066	0.044
Secondary grad	0.215	0.211	0.028	0.039	0.058	0.063	0.089	0.097	0.119	0.133	0.162	0.211
By ethnicity												
Illiterate	0.655	0.652	0.214	0.157	0.124	0.125	0.096	0.084	0.057	0.067	0.045	0.031
Literate	0.401	0.397	0.088	0.088	0.099	0.096	0.097	0.099	0.105	0.104	0.109	0.116
By children's nutritional status												
Wasted	0.532	0.532	0.191	0.170	0.085	0.043	0.149	0.149	0.106	0.043	0.043	0.021
Not Wasted	0.611	0.605	0.174	0.143	0.124	0.129	0.107	0.090	0.070	0.066	0.062	0.036
Stunted	0.840	0.833	0.314	0.201	0.149	0.137	0.075	0.040	0.033	0.019	0.023	0.009
Not Stunted	0.540	0.535	0.132	0.126	0.115	0.125	0.117	0.106	0.083	0.079	0.073	0.044
National (children)	**0.610**	**0.604**										

Source: ENNIV (1997) and author's calculations

PUBLIC SERVICES IN PERU

Peru, like most other developing economies, concentrates most of its social spending in education and health. Public education is provided tuition-free to anyone who wishes to attend, from pre-primary through post-secondary schools. In practice, families bear some costs for books, uniforms, and dues for parent-teacher organizations, which often fund needed construction or reparations to the school. But these costs remain relatively low. Urban students appear to have to problem getting access to a school, though in more remote rural areas, secondary schools continue to be scarce, despite a substantial effort to build new schools during the past decade.

For health, the public sector in Peru has two main providers of medical services: the *Instituto Peruano de Seguro Social (IPSS),* a social insurance scheme for workers in the formal sector of the economy and their families, and the Ministry of Health (MINSA), which is responsible for everyone not covered by the IPSS or a private insurance plan. In addition, the military (FF.AA.) provides medical services for soldiers and police officers. All of these institutions manage both hospitals and health centers or posts. Because the IPSS is an insurance scheme, its services are usually free, with costs covered out of regular employee contributions. Services at the MINSA have been free in the past, although the government began to charge user fees in the early 1990s, a practice that continues. Nevertheless, the policy change probably was not as abrupt as it appears. MINSA patients have always had to pay for medicines, laboratory services, and other supplies, in effect receiving only the consultation free of charge. At the same time, each institution's staff is permitted to waive the fees if a patient is deemed to be poor. As with schools, there has been a substantial effort to construct new health care facilities in the 1990s, especially in rural areas.

While there are a wide variety of other anti-poverty programs, they are mostly small, diffuse, and vulnerable to abrupt and substantial budget reductions. Almost all social spending except health and education disappeared during the hyperinflation and stabilization of the late 1980s and early 1990s. Nevertheless, a few social programs outside of health and education, most notably feeding programs for children, have taken hold in the past decade and now serve a substantial number of Peruvians.

One method to judge the size and importance of a public service or program is to find how large its budget is. This is difficult in Peru, where funding for one type of service may come from several distinct sources, and where one agency may fund many different services. As a result, only the broadest descriptions are available, and they tend to be *ad hoc*, reflecting the efforts of one particular researcher rather than a systematic process. The World Bank (1999) reports that in 1996, education accounted for 22 percent of total government spending, health another 10 percent, and anti-poverty programs 3 percent. Within sectors, the Ministry of Health (Francke, 1997) reports that for 1994, 54 percent of public spending on health went to hospitals, 33 percent to health centers and posts, and the remainder to administration. Alfageme and Guabloche (1998) report that in 1995, primary schools received 32 percent of the education budget, secondary schools received 23 percent, post-secondary received 21 percent, with administration accounting for almost all the rest. For food programs, the *Vaso de Leche* (glass of milk) program accounted for 30 percent of the anti-poverty budget in 1998, and other food programs accounted for 20 percent.

BENEFIT INCIDENCE ANALYSIS

This first part of the paper presents a fairly standard incidence analysis (Demery, 1997; Selden and Wasylenko, 1991). It also includes the paper's first major extension of traditional methods: a significant expansion of the budget items covered with the traditional methods.

Incidence analysis has seen a resurgence in recent years, particularly among development practitioners, but also a resurgence of methodological criticism (Piggott and Whalley (1987); van de Walle (1998); Lanjouw and Ravallion (1997)). Much of this criticism can be summarized with a simple statement: incidence analysis offers only a description of who currently benefits from public programs and services, whereas most policy analysis would require a comparative statics type of result: what happens to the distribution of benefits, or poverty, if the government changes its expenditures? For the benefit incidence description to give an accurate assessment of the impact of a marginal increase in public expenditures on a program or service, the marginal benefits must go to existing users, and the must be proportional to the current benefits received. This is quite limiting, telling us nothing about, for example, the incidence of an expansion of program coverage (i.e. to new beneficiaries), or the incidence of spending on only one component of the public service. It is accurate, on the margin, for a price/subsidy change, and any other change in benefits that is proportional to existing demand. In addition, the description itself is also useful to policymakers.

METHODS

Measuring and comparing the incidence of the benefits of public services requires three steps. First, one must value the benefit to an individual of going to a public school or receiving health care in a public facility. Second, one must rank households, from poorest to richest. Third, one needs a decision rule that determines when one distribution is better, the same as, or worse than another. In this section, I discuss my approach to each step.

Valuing Public Services

How much is a publicly subsidized social service worth to recipients? At least three factors complicate the answer to that question. First, public services often have a uniform (non-market) price of zero, so using observed expenditures is of little use. Second, many public goods are discrete. No one chooses two primary educations or a second polio vaccination, no matter how cheap they are. This implies that the typical marginal conditions when demand is continuous do not apply, and the marginal value of a discrete service may be quite different from the price that the users paid. Third, many publicly provided services are rationed, which also removes the standard equality between price and marginal benefit of a service.

The simplest approach to valuation, which I rely on heavily in this paper, begs all of these questions and uses a binary indicator of whether or not one accesses a service. Implicit in this method is that all who use a service or participate in a program receive the same benefits. This is obviously not correct, and most likely introduces a systematic bias in the results because the poor probably attend lower quality schools and receive lower quality health care. In addition, one cannot sum these binary indicators across services to get, for example, the total benefit of all

health and education services to an individual. Nevertheless, the method is easy to implement, and going beyond it is not easy.

The more standard approach in the recent literature values the service at the government's average cost of provision. This approach is also tenuous. There is no particular reason to believe that perceived benefits are equal to the cost of provision because governments usually do not charge average (or marginal) costs for their services. In addition, the data used for determining average costs are often very poor, drawing on budgets (rather than actual expenditures) at highly aggregated levels such as regions or provinces. This is especially problematic in Peru, where budgets are difficult to disaggregate regionally, and a given type of service (say, school breakfasts) often has funding from several different sources. Further, Younger (1999) and Sahn and Younger (1998) provide evidence for many countries indicating that this method rarely produces results that differ greatly from the simpler use/non-use comparisons.

A third approach would be to estimate demand functions for public services and to use compensating variations from those functions to estimate their value to each household (Gertler and Glewwe 1990; Gertler and van der Gaag 1990). As one of my extensions to the standard methods, I have estimated demand functions for public education in rural Peru. I then calculate the compensating variation associated with the subsidy implicit in free public schooling and examine the distribution of this "willingness to pay" measure of benefits to users.[5]

Ranking Individuals from Poor to Rich

In keeping with generally accepted convention, I use household consumption expenditures per capita as a money metric of welfare when using ENNIV data, and household income per capita when using the ENAHO. While this welfarist approach to social evaluation has its limitations, expenditures or income are the most widely used method of making interpersonal comparisons. All the surveys measure household rather than individual consumption, so I am bound to use household data, which I scale per capita. While previous research has shown that many welfare results are quite sensitive to judgments made about how household size and composition affect the money metric of welfare (see for example, Buhmann, et.al.; Sahn, Younger, and Simler 1998), Sahn and Younger (1998) and Younger (1999) find that the types of comparisons that I make in this paper are often robust to different equivalence scales.

Comparing Distributions

My method of comparison tests for welfare dominance, following Yitzhaki and Slemrod (1991).[6] These authors construct concentration curves, which are similar to Lorenz curves in that they graph the cumulative welfare distribution against the cumulative benefits from a particular social service. They prove that for any social welfare function that is increasing, anonymous, and that favors an equitable distribution of income, changing the structure of expenditures by slightly increasing one subsidy, x, and reducing those on another, y, by just enough to keep total expenditures constant will improve social welfare when x's concentration curve is everywhere

[5] Younger (1999) pursues all three methods for Ecuador and finds that, while the estimates of valuations and the concentration curves for a given public service can vary substantially across methods, the orderings of services are completely consistent across methods, as are comparisons with the two benchmarks.

[6] Kakwani (1980) and Donaldson and Weymark (1980) develop similar ideas in a more abstract setting.

above y's.[7] The intuition is straightforward. If poorer households tend to receive more of the benefits associated with a particular type of social sector expenditure, say primary education, and less of another, say secondary education, then reducing expenditures on the latter to pay for more of the former will improve the distribution of welfare. We refer to this as welfare dominance because of the analogy with the concept of second order stochastic dominance in the finance literature.

The Yitzhaki and Slemrod comparisons are inequality comparisons, because they consider dominance over the entire welfare distribution. If our concern is only poverty, however, we might want to consider dominance over only the "poor" households, i.e. up to the poverty line, ignoring reversals that occur between the non-poor. Some examples surface in the empirical results.

In addition to comparing the concentration curves for different types of social services, I also compare each concentration curve to two benchmarks: the Lorenz curve for per capita expenditures and the 45-degree line. One can say that a social sector expenditure is progressive if it benefits poorer households more than wealthy ones relative to their expenditures per capita, and regressive if it does not.[8] At the same time, public expenditures, especially in the social sectors, are often held to a higher standard than taxes in their being considered well targeted to the poor only if the benefits go disproportionately to the poor in absolute terms, not relative to income. I will call such transfers "per capita progressive" and note that they have a concentration curve that is above the 45-degree line (concave rather than convex). I will call social services whose concentration curve is above the Lorenz curve but below the 45-degree line simply "progressive" and those below the Lorenz curve "regressive," analogous to the standard tax literature.

Using concentration curves is a substantial generalization of the more usual practice of dividing the sample up into discrete groups such as quantiles or "poor/non-poor" and then examining the characteristics of each group. Nevertheless, that information can be read from the ordinates of the concentration curve graph. For example, if the poverty line is set such that x percent of the population is poor, then one has only to read the ordinate corresponding to the value x on the horizontal axis. For quantiles, the share of the sample in each quantile receiving benefits is the difference between the ordinates at the top and bottom of the quantile.[9]

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[7] Yitzhaki and Slemrod actually develop the argument in terms of commodity taxes, but it is equally applicable to transfers, or combinations of taxes and transfers. Technically, the argument also requires that the efficiency consequences of the expenditure/tax change be at least neutral, i.e. that the efficiency of the allocation of resources not worsen with the change. This condition is more difficult to identify in practice, particularly when considering goods and services with externalities, but I will assume that it is satisfied in this discussion.

[8] This is not quite the same as the textbook definition of progressivity, which requires that the marginal tax (benefit) rate be everywhere below (above) the average rate across the welfare distribution.

[9] One datum that cannot be obtained from the graphs is Cornia and Stewart's (1995) first type of targeting error: omission of the poor from a program. The concentration curves tell us nothing about how many poor people do not benefit from a public service. The second type of error (leakage to the non-poor) is easily identified as one minus the ordinate at the poverty line.

Because the concentration curves are constructed from sample data, comparisons between them are, or should be, statistical.[10] To test to see whether two concentration curves are statistically distinguishable, I use a new estimator of the covariance of the ordinates of possibly dependent concentration curves due to Davidson and Duclos (1997). I conduct these tests at 19 evenly-spaced ordinates, from 0.05 to 0.95, rejecting only if all the ordinate pairs are significantly different.[11]

When the dominance tests fail to reject the null we are left with inconclusive results in terms of providing information on the relative progressivity of different types of public expenditures. In these cases, I resort to a second approach to draw conclusions about welfare evaluation and incidence analysis, the use of specific cardinal measures of welfare.[12] The most common is the Gini coefficient, though any of the several options for inequality indices are also plausible. Yitzhaki (1983) shows that an extended Gini coefficient (or S-gini) can adjust the weight given to each point on a Lorenz curve and thus give a clearer notion of how more progressive social welfare functions would rank distributions. To draw conclusions similar to the dominance tests, I calculate Ginis for parameter values from 1.01 to 4 in steps of 0.5 for household expenditures and for all the transfers.[13] If all 7 pairs of S-ginis (from v = 1.01 to 4) are significantly less for one of the social services, I conclude that it "dominates" the other. Use of this term clearly does not have the same rigorous foundation in welfare analysis as the ordinal measure. I choose it only because the implied policy conclusion is similar, even if it is based on cardinal measures.

CROSS-SECTION RESULTS: THE 1998-II ENAHO DATA

The ENAHO 1998-II survey contains a large amount of information on social services that households use, including:

- whether the household has a connection to various public utilities (water, sewer, etc);
- whether household members attend school, and many characteristics of those schools;
- whether household members attending school received a variety of supplemental services at school, such as free breakfasts, medical care, etc.;

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[10] It is not unusual that findings regarding dominance are not based on statistical tests of differences in concentration curves. See for example, Jenkins and Lambert (1993).

[11] Howes (1996a) shows that we can only be sure that the probability of type I error is no more than the critical value if we reject the null hypothesis in the case that the difference in the ordinates of the two curves is non-zero for *every* ordinate tested and, obviously, that the difference be of the same sign. This decision rule is clearly less likely than the more common one to reject the null in favor of dominance. In practice, I find that it leads us to accept the null quite often, limiting what we may conclude about the relative progressivity of categories of expenditures. However, bounding the size of the test at the risk of low power is consistent with standard econometric practice, and I follow it here.

[12] Research testing for the progressivity of social insurance and assistance in Romania shows that using cardinal measures allows one to draw more inferences about the progressivity of public expenditures [Sahn, Younger, and Simler (1998).]

[13] Duclos (1996) uses "leaky bucket" experiments with Canadian data to arrive at an upper limit of 4 for the S-gini parameter.

- whether household members who were sick or injured in the past three months received medical attention, and where;
- whether women ages 12-49 received breast cancer and pap smear exams, and where;
- whether the last born child of women ages 12-49 received the standard childhood vaccinations;
- how many times the children younger than six of women ages 12-49 received well child medical care;
- whether any member of the household benefited from a variety of other social programs.

In all, there are more than 70 variables indicating a given social service or a characteristic of it in the ENAHO data. Because the definitions of each variable are cumbersome, depending on the exact wording structure of the survey, I relegate their precise derivations to Appendix I. I will only mention aspects important to the results as the discussion proceeds.

I have already noted that budget information for these services and programs is difficult to obtain in Peru. Thus, I first use the coverage rate of each to measure its importance. The following section gives the share of each program's target population that actually receives benefits. In some cases, the target population is clear: all children of a certain age should be in school; everyone should have a polio vaccination; etc. For other items, however, the base is not so clear. For health consultations, we might think that all people who were sick in a given period are the appropriate population, but self-reported illness is notoriously inaccurate in survey data, and many people who have access to free health care will choose nevertheless not to visit a doctor if the illness is minor. In the discussion that follows, I lay out the reference population for each service/program, with an explanation of the rationale when it is not obvious.

I should note from the outset that these data on program coverage are not the same as the incidence of program benefits, even when one presents them by quantile as I do here. That is because the target population is not usually distributed evenly across the welfare distribution. Thus, an adult literacy campaign might have identical coverage rates across the income distribution and still be highly progressive because the target population itself (illiterate adults) is concentrated in the poorer quantiles. Thus, it is better to postpone consideration of progressivity to the following section, where I examine the incidence of each program in detail. Here, the point is only to gauge the size of each service or program and the extent to which it reaches its target.

Coverage Rates for Public Services

Education

Table A1 shows enrolment ratios for the four levels of schooling in Peru. The ratios are the total number of enrolled students divided by the sum of plus any children of the appropriate age for the level who are not studying at another level. Note that unlike gross enrolment ratios (number of students over number of children of the appropriate age), this ratio cannot exceed one.

Pre-primary (*educación inicial*, *nido*, or *PRONOEI*) is not required to enter primary school, but more than half of Peruvian children attend, the vast majority of them in public

schools. As at other levels, significant private enrolment only occurs in the top two quintiles. Primary school attendance is nearly universal, and this is true across all quintiles. Public enrolment does decline at the higher quintiles as wealthier families elect to send their children to private schools, but this probably does not represent a failure to provide access to public schooling. Secondary enrolment ratios are also high, though the poorest children clearly start to drop out of the school system at this level. Public enrolment is also lower for the top quintile, again because these children are attending private schools. Post-secondary enrolment is much lower, though not atypical. Public coverage is evenly spread over the top four quintiles, but noticeably lower for the poorest. Finally, I consider adult literacy campaigns. Here, the target population comprises all people older than 11 who have not graduated from primary school or higher and are not currently enrolled in school. This is the only education service where coverage is higher for the poorer quintiles, and this is in spite of the fact that 40 percent of eligible adults are in the poorest quintile, and 63 percent in the two poorest.

Education Quality

In addition to school attendance, the ENAHO questionnaire collects information on quality characteristics of the schools that children attend. These include infrastructure such as water, sewer, and electricity connections, whether the school has a nurse's station, and whether it has a playground or gymnasium. In addition, the questionnaire asks about several supplementary services that various agencies deliver through the public schools such as medical and dental well visits, school breakfasts, and health insurance for school children. Finally, we know whether the child rides a public bus to get to school. Tables A2 to A4 present coverage of these characteristics and services for pre-primary, primary, and secondary schools. For these tables, the denominator of the coverage ratio is the number of students attending the type of school, not all the potential students, while the numerator is the number of students that attend a school with the characteristic or service.

In general, private schools have substantially better infrastructure than public schools. Also, infrastructure characteristics improve with the level, for both public and private schools. Coverage rates for infrastructure in public schools are much lower for the poorer quintiles, while for private schools the coverage is more even across the welfare distribution. Coverage for supplementary services is much smaller, reflecting the limited size of these programs. These programs are mostly limited to public schools, so non-zero entries in the private school rows are anomalous and may reflect data errors (and small sample sizes). But even in the public schools, coverage is limited, and not clearly related to income. The one exception is school breakfasts, one of the largest anti-poverty programs in Peru. This program reaches about 40 percent of pre-primary and primary students, and coverage is higher in the lower quintiles, reflecting the programs' efforts to target poorer students.

Health Consultations and Hospitalizations

The ENAHO questionnaire, like many other household surveys, first asks if people were sick or injured in the past three months and then, only if they were, where they sought medical attention. This approach both ignores the possibility that someone would consult a doctor even if healthy (say, for a regular check up) and, more importantly, relies on people's self-reported

illness. Virtually every survey of this type finds that poor people report fewer illnesses than the wealthy, which seems unlikely. Rather, for a given set of symptoms, rich people are more likely perceive themselves as sick, for whatever reason. To avoid this bias, I use as the "target population" all people in the survey, not just those reporting an illness or injury. This means that the coverage rates will seem low – not everyone needs to go to the doctor in a three-month period. But this measure treats all people as equally needy of a medical consultation, whereas using those reporting themselves to be ill would produce a bias against poorer people.

Tables A5 to A8 show the coverage rates for medical consultations and hospitalizations. MINSA handled about half of all medical consultations during the past three months, of which about a third were at a hospital and the rest at centers and posts. At centers and posts, the coverage rates are higher for the poorer quintiles, but they are roughly even for consultations at MINSA hospitals. The next largest provider of consultations was a pharmacist, reflecting a common practice of self-treatment for minor ailments. Note that this is not correlated with income. Consultations at the IPSS, either centers or hospitals, are much more concentrated in the top quintiles, reflecting the nature of this insurance. Because it is tied to formal sector employment, its participants tend to be better off than the population as a whole.

In addition to knowing where a person sought care, the survey also permits us to identify treatments that were free of charge. Comparing tables 5 and 6 shows that about a quarter of all MINSA consultations were free of charge. More importantly, coverage of free non-hospital consultations is even more skewed toward the lower quintiles than consultations in general, indicating that centers and posts do, on average, tend to waive the fees for poorer patients. For MINSA hospital consultations, however, the data are less clear. Only the second quintile has coverage higher than the others.

Tables A7 and A8 give coverage rates for hospitalizations and hospitalizations that were free of charge. These rates are very small (not many people go to the hospital in a three-month period) and show little clear pattern across the income distribution.

Women's and Children's Well Care

In addition to the standard questions about health consultations, the ENAHO survey asks women ages 12 to 49 whether they have had a breast cancer exam and/or a pap smear in the past year; the number of well child visits that their children under age 6 have made in the past year; and, if their last child born is under 6, whether s/he had any of four standard vaccinations (tuberculosis, polio, DPT, and measles). Tables A9 to A11 report coverage rates for these preventative services. Note that, unlike the health consultations above, ideally coverage should be 100% for these services. For vaccinations, this is very nearly true (Table A11). 93 percent of children have had at least one vaccination[14], the vast majority doing so through the Health Ministry. In no case is there a clear correlation between coverage and the income quintile, even for the IPSS, except that perhaps relatively more poor children receive their vaccinations in special campaigns rather than as part of a regular health consultation.

[14] The correlation between having received one vaccination and having received them all is very high.

Coverage for women's preventative care is much worse. Only 20 percent of women 12 to 49 have had a pap smear in the past year, and only 11 percent have had a breast cancer exam. Again, the Health Ministry did most exams, and coverage rates for exams during regular MINSA consultations (non-campaign) are higher for the richer quintiles, while coverage rates for exams during a campaign are higher for the poor. Coverage rates for exams at the IPSS are fairly even across the income distribution.

Social Programs in General

The 1998-II ENAHO survey contains a special section on social benefits. The questionnaire asks if any member of the household has benefited from 15 different social programs. The answer, however, is a simple yes/no, with no accounting for the extent of benefits. In particular, there is no way to distinguish a household with one beneficiary from one with many. Table A12 shows the coverage rates for these programs, with rates calculated over the number of households in the sample (*comedor popular*, family planning, tuberculosis exam, the number of households with children of pre-primary or primary school age (*vaso de leche*, all the school programs)), or the number of households with children under six (other food programs, child well visits, childhood vaccinations). Coverage of the child-oriented food programs is quite high, with 44 percent of all households with children ages 3 to 11 benefiting from the *vaso de leche* program, and another 34 percent benefiting from school breakfasts. While there is some overlap of these programs – 9 percent of households benefited from both – a large majority of households with small children benefit from these feeding programs, and coverage rates are better among the poorer quintiles. Vaccination coverage looks much lower here than in the previous section, but this question asks about benefits in the past three months. Since vaccinations are once-off events, we should expect this to be low. The child well-visit numbers are also lower here than in the previous section, for three different reasons. First, the reference period in this section is three months, while it is one year in the child health section. Second, this section only asks whether there was any visit for a household member, not how many. Both of these differences will tend to make this section's estimate lower. On the other hand, this section asks about benefits for anyone in the household, not member by member, which would tend to increase its estimates. Coverage rates for these health benefits are more balanced across the quintiles. Coverage for most of the other social programs is substantially lower, but they usually favor the poorer quintiles.

Public Utilities

Table A13 shows the share of households with connections to various public utilities. Electrification rates are highest, with over two-thirds of households using electricity for illumination and/or cooking. About half of homes have regular trash collection, and water and sewer connections. And despite privatization and a substantial increase in telephone infrastructure investment, relatively few households have a fixed line telephone.

Relative Progressivity of Social Services

Figures A1 to A7 present concentration curves for all of the social programs and services considered in the ENAHO 1998-II survey. Visual examination of these graphs can give a sense of which benefits are most progressive. Tables A14 to A22 contain the corresponding statistical

tests, with each table presenting both Howes-type dominance tests and tests based on differences in S-ginis. The large number of benefits considered makes comprehensive comparisons clumsy. Instead, I will break down the comparisons into types of services, with relevant reference points.[15]

Education

Figure A1 shows that the concentration curves follow a standard ordering: pre-primary and primary schooling are the most progressive, followed by secondary and then post-secondary. An interesting addition is the benefits of adult literacy campaigns, which are highly progressive. This is the logical outcome of the target population: illiterate adults tend to be poor, giving a clear example of how a program with limited coverage can nevertheless be highly progressive by choosing its targeting mechanism well. The statistical tests in Table A14 show that all of the benefits except post-secondary schooling are progressive, i.e. they are less concentrated than household income. Adult literacy, pre-primary, and primary school attendance are all per-capita progressive, i.e., they all dominate the 45-degree line. Secondary school attendance crosses the 45-degree line, while we cannot reject the null that post-secondary schooling differs from the 45-degree line. On this last conclusion, however, it is important to note that the only abscissa where the t-statistic does not reject is at 0.95.[16] Thus, if we restrict out attention to dominance for poorer households only, we would conclude that the benefits of post-secondary education are in fact less than equally distributed for the poor, as long as the poverty line were below the 95th percentile, which seems a safe bet.

The same argument applies for the comparison of literacy campaigns to other educational benefits. For a large part of the sample, the literacy concentration curve is significantly above the curves for primary school (up to the 70th percentile), pre-primary school (up to the 80th percentile), and secondary school (up to the 80th percentile). Similarly, primary school dominates secondary up to the 90th percentile. Thus, even though many of the dominance tests do not reject the null over the entire income distribution, a focus on the poorer quantiles suggests the following ordering: (1) adult literacy benefits, (2) pre-primary and primary school, (3) secondary school and the 45-degree line, and (4) post-secondary education and income. This shows up clearly in the tests based on S-ginis in the lower half of the table, where precisely this ordering obtains.

Education Quality

Tables A15 to A17 present dominance tests for school quality characteristics, by level of schooling. One interesting result in these figures is that the concentration curve for school attendance is above the curves for school quality measures, at each level of schooling. For pre-primary and primary schooling, the statistical tests show that attendance dominates most of the other quality characteristics. Further, even in the cases where we do not reject the null (playgrounds and nurse's stations for pre-primary, playgrounds for primary), the curves are different up to very high percentiles (70th, 80th, and 90th, respectively) so that a dominance conclusion for the poor is valid. For secondary schools, but the weaker tests based on S-ginis still

[15] A spreadsheet with the statistical tests for all 2664 pair-wise comparisons is available upon request.
[16] Recall that rejection of the null requires rejection at all test points.

show some evidence that attendance is more progressive than quality. These results indicate that, even within the public school system, wealthier children attend better-quality schools (as measured by these infrastructure characteristics), so that the benefits of public school are not as progressive as the concentration curves for attendance alone suggest.[17]

A second, less robust, result is the ordering among the quality variables, which is identical for each level of schooling: playground, water, electricity, sewer, and nurse's station. Even though most of the dominance tests are not significant, most of the S-gini tests are.

It is also interesting to note that there is a strong negative correlation between the coverage rates presented in the previous section and the gini coefficient (as a measure of equity): -0.87, -0.88, and –0.94 for pre-primary, primary, and secondary, respectively. This means that the highest coverage services are also the most equitably distributed. If we assume that communities acquire their infrastructure sequentially and over time, i.e. first you get a school, then you get a playground for it, then water, electricity, sewerage, and finally a nurse's station, then we can relate this finding to the "early capture" idea in Lanjouw and Ravallion (1998). In particular, these data suggest that wealthier communities are able to capture school infrastructure earlier than poorer ones. An implication is that the marginal benefit of current infrastructure spending will be more progressive than the already quite progressive average distribution that we capture in this paper.

Supplementary Services at School

Many social services are delivered via the public schools in Peru, particularly at the primary school level. Since we already know that public school attendance is *concentrated* among poorer households, this is an easy method of targeting the poor. In some instances, it seems to work well: school breakfasts (*desayuno escolar*) and the *vaso de leche* program (shown under social services below) are by far the largest of these programs, and their distribution is even more progressive than attendance at a public primary school (Figure A2 and Table A18).[18] Free school uniforms and free textbooks (far smaller programs) are statistically indistinguishable from primary school attendance, even using the S-gini comparisons. The medical, dental, and insurance benefits are less progressive, though not significantly so by the dominance criterion. Nevertheless, the S-ginis for primary school attendance are significantly lower than those for these supplementary benefits.

Public Health Consultations

Figures A3 and A4 present concentration curves for consultations and hospitalizations at public health facilities. The most obvious result here is that services delivered via the Ministry of

[17] This, in turn, suggests a problem with standard benefit incidence studies that rely on school attendance data only.

[18] There are two variables for school breakfast. The first and most progressive comes from the education section of the survey, where households state whether each child has benefited from a school breakfast. The second comes from the social programs section, where the question is whether anyone in the household has benefited, with a yes/no answer. Since it is likely that one sibling will receive a school breakfast if another does, the latter question understates the progressivity by giving too little weight to households that receive a school breakfast.

This has implications for the other questions coming from the social programs section of the survey. In particular, the progressivity of free school uniforms, free textbooks, and school insurance is likely to be understated.

Health are much more progressive than those at the IPSS.[19] This is a logical result of the Peruvian health system's structure: IPSS is for families of workers in the formal sector, who are generally better off than the population in general, while the Ministry picks up everyone else. This is not really a condemnation of the IPSS – it is not intended to be an anti-poverty institution – but it does argue against any subsidy to the social security health services on equity grounds. The differences between the Ministry and the IPSS are so consistent and striking, and the differences within services at the IPSS are so minor, that I have not included the IPSS services in the following discussion, preferring to concentrate on the MINSA services that are supposed to have an anti-poverty effect.

Apart from finding that almost all of the health services are progressive (i.e. that they dominate the income distribution), the dominance tests in Table A19 provide only two rejections: non-hospital consultations that were free of charge dominate hospital consultations that were free of charge, and non-hospital consultations dominate hospital consultations. Thus, one can make a case that consultations at health centers and posts are more progressive than those at hospitals, a finding that is common in incidence studies. More surprisingly, none of the services is per capita progressive by the dominance criterion. As with the education results, several of the tests miss rejecting the null only at one or two abscissa: non-hospital consultations miss dominating the 45-degree line at only one point, the 5th percentile, and free non-hospital consultations do so only at the 5th and 10th percentiles. Similarly, free non-hospital consultations dominate non-hospital consultations in general from the 20th percentile and up. Nevertheless, unlike the education results, these points are at the low end of the income distribution, which is most important for a poverty comparison. Thus, a conservative approach should stick to the results Table A19. Use of the S-gini comparisons, however, shows many more dominance results. The lack of significant results for hospitalizations probably reflects the very small numbers of cases in these data, as noted in the coverage section.

It is interesting to compare the incidence of health consultations in general with those that were free of charge. In theory, officials at Health Ministry facilities are able to waive fees if they believe that a patient is sufficiently poor to merit free attention. This is completely *ad hoc* and decentralized, relying only on the staff's judgment at each institution. The evidence suggests that this process does not work well for the very poorest – the concentration curves for free consultations and regular consultations are very close to each other at the lowest quantiles (Figure A3). But from the 15th percentile up, the free consultations are in fact more concentrated among poorer people than those that required a fee. A similar story holds for hospital consultations, except that these curves come back together at the higher percentiles, indicating excessive incidence in the highest part of the income distribution. In general, it seems that the targeting of fee waivers should be improved.

Women's Preventative Health Services

Figure A5 and Table A20 give the incidence of breast cancer examinations and pap smears, and the associated statistical results. Both types of exam are less progressive than regular

[19] The number of cases at military hospitals is quite small, so I have not included them here. Their concentration curves are quite close to those of the IPSS.

health consultations outside of campaigns, which are special, *ad hoc* programs designed to promote these particular exams. There is weaker evidence that the campaign-based exams, for which there are few observations in these data, are more progressive than the regular ones, in that the S-gini comparisons show a significant difference. However, none of the exams is per capita progressive, and the regular health consultations dominate even the campaign exams over a significant portion of the income distribution (up to the 65th percentile). In general, then, it seems that these preventative services are less progressive than general health consultations for those that are sick.

Children's Preventative Health Services

Figure A6 and Table A21 present the results for the incidence of children's preventative health services, vaccinations and child well visits. I have already noted that the survey asks about these services in two different places, with possibly different outcomes. In this case, both vaccinations and child well visits are per capita progressive, by both measures, although there is a large difference between the S-ginis for the two vaccination measures. The dominance tests show little else of interest, but for the S-ginis, vaccinations received as part of a special campaign are more progressive than those received at a regular check-up. Vaccinations received in a campaign and child well visits also dominate regular non-hospital consultations (for anyone) at the MINSA by the S-gini criterion, but not consultations provided free of charge, suggesting that the targeting of these specialized services is not very different from that of health consultations in general.

General Social Assistance

Finally, the "social programs" section of the ENAHO asks whether any member of the household has benefited from a long list of programs. Figure A7 and Table A22 present results from this section, for all the services that had a non-trivial number of positive responses. Not surprisingly, all of the services are progressive, and the services tied to schooling, including the two feeding programs, are per capita progressive, the one exception being school health insurance. On the other hand, programs oriented more to adults, family planning, and soup kitchens, are less progressive. The "other food" variable is by far the most progressive, and dominates all the others by the S-gini criterion.

THE DEMAND FOR PUBLIC EDUCATION IN RURAL PERU

One of the limitations of standard benefit incidence analyses such as the one presented in the previous section is the arbitrary valuation used for public services. One way to generalize the analysis and avoid this problem is to estimate the demand for public services and use the compensating variation from the demand estimates to value the services to households (Younger, 1999). This approach, sometimes called the "willingness to pay," uses preferences revealed in the demand estimates to measure their value, rather than an arbitrary cost or 0/1 use indicator.

In this section, I estimate the demand for primary and secondary education in rural Peru. I use data from the 1994 ENNIV survey, which includes several questions about school quality that are useful for estimating school choice equations. As is now customary, I use a discrete choice model (Gertler and Glewwe, 1990, Gertler, Locay, and Sanderson, 1987). While it is

customary to consider three options for schooling – no school, public school, or private school – in rural Peru, only about 2 percent of children attend private schools, making an estimate of demand for the private options infeasible. Thus, I estimate only the choice between attending school or not, a simple logit model.

I limit my attention to rural areas because a model with only a few choices is not appropriate for most urban areas. A resident of Lima has his or her choice of dozens of schools, public or private. No survey in Peru (or elsewhere) permits us to adequately identify, let alone model, these choices.

The model is by now well-known. We assume that each household has a utility function that depends on its consumption and on the quality of the school choice that it makes:

$$V_j = f(y-p_j) + Q(X_j,Z) + e_j$$

where j indexes the choice (no school or school); y in household permanent income, proxied by household expenditures; p_j is the price of choice j, including all opportunity costs of time; Q is a function that measures quality, which depends on choice-specific characteristics X_j and on household or personal characteristics Z. Since the logit can identify the model only up to the differences in V_j, we must normalize against one option, which will be the no school choice here. Thus, I assume that $Q(X_0,Z)=0$. In my estimates, I assume that the function f() is logarithmic, and that it is constrained to be the same for each option. There is some debate about this latter restriction in the literature (Dow, 1998), but as Gertler and Glewwe (1990) note, it is necessary to get a sensible estimate of the marginal utility of income which, in turn, is necessary to calculate compensating variations (Small and Rosen, 1980). The function Q() is linear.

The samples include all children who are either attending school or who are "eligible" to attend school. The latter group includes all children of the appropriate age who have not yet graduated from the level of school under consideration. For secondary school, I include even children of secondary age who have not graduated from primary school, the argument being that, in the context of a long-run optimization, the decision not to complete primary school is affected in part by perceptions of the value of secondary school. Dow (1998) defends this type of unconditional estimate.

RESULTS

Table 2 gives the results of the logit estimates for primary and secondary school choice, based on the 1994 ENNIV survey. Apart from a child's age (which has been scaled by 0.1 for these estimates) and some quality variables, very few variables are significantly different from zero in the primary school choice equation. There is some evidence that living in a household with larger numbers of small children reduces the probability of attending primary school, and, surprisingly, that children from indigenous households are *more* likely to attend primary school. For quality variables, children in clusters where parents said that they would like to improve their schools' site, its food service (including school-based feeding programs in Peru), its teachers' training, and the quality of its auxiliary personal are all less likely to attend school.

Table 2 – School choice demand equations, Peru, ENNIV 1994

	Primary		Secondary	
Log-Likelihood:	-807.936		-747.541	
Observations:	2148		1359	
Likelihood ratio index:	0.457		0.206	
% Correct Predictions:	86		71	
Variable	β	t-value	β	t-value
Constant	-13.686	-13.876	-3.521	-2.250
Child's Characteristics				
Age	38.814	22.958	-0.643	-0.389
Age squared	-19.985	-23.042	0.650	1.328
Gender	0.066	0.438	-0.119	-0.760
Indigenous	-0.250	-0.878	-0.035	-0.127
Gender x Indigenous	0.743	3.445	-0.154	-0.762
Child of HH Head			0.866	0.980
Spouse of HH Head			1.844	1.583
Other HH Member			0.804	0.895
Married			-0.641	-1.013
Married x Gender			-2.789	-2.776
Household Head's Characteristics				
Age	-0.099	-1.232	0.164	1.964
Gender	-0.109	-0.424	0.009	0.038
Born in Urban Area	-0.025	-0.176	0.222	1.542
Years of education	-0.548	-0.985	2.354	4.366
Years of education squared	0.381	0.947	-0.745	-1.874
Household Characteristics				
Number of members age 0 to 5	-0.119	-1.826	-0.097	-1.408
Number of members age 6 to 12	-0.099	-1.414	-0.297	-3.269
Number of members age 13 to 18	0.010	0.122	0.228	2.486
Number of members age 19 to 60	0.123	1.782	0.040	0.672
Number of members over age 60	0.201	1.140	-0.130	-0.775
ln(net household expenditures)	1.695	0.399	1.232	1.563
School Characteristics				
Number of Books School Requires	-0.128	-1.455	0.193	2.335
Share of parents wanting to improve:				
the school site	-0.700	-1.913	0.508	1.348
the school's furniture and bathrooms	-0.271	-1.106	-0.602	-2.628
the school's food service	-1.165	-3.106	-0.239	-0.660
the number of students per classroom	0.193	0.230	-0.597	-0.812
the teachers' training	-0.607	-1.936	0.084	0.286
the teaching materials	0.117	0.244	-0.117	-0.256
the school library	-0.315	-0.895	-0.146	-0.456
the power of the school principal	-0.277	-0.262	0.496	0.424
the quality of auxiliary personnel	-2.059	-2.465	0.093	0.107
some other aspect of the school	-0.417	-1.116	0.457	1.272
Repetition rate, local primary school	0.104	0.279	-1.280	-3.197
Repetition rate, local secondary school	2.327	1.722	2.637	2.428
Travel time to school	-0.092	-0.396		

Source: ENNIV 1994 and author's calculations

For the purposes of evaluating households' willingness to pay for primary schooling, the most important result is the coefficient on the log of net income, which is not significantly different from zero in the primary school equation, indicating very little income or price sensitivity of demand. In fact, as Table 3 shows, the demand elasticity is virtually zero across the entire expenditure distribution. Thus, the approximation provided by the simple 0/1 method used above will be accurate, as we shall see shortly.

Table 3 - Average price elasticities of demand and compensating variations, by quartile

	Quartile			
	1	2	3	4
Primary school				
Mean own-price elasticities, by quartile	-0.010	-0.008	-0.007	-0.004
Mean CV, by quartile, zero to mean price	67.6	66.1	63.8	65.7
Secondary school				
Mean own-price elasticities, by quartile	-0.207	-0.131	-0.091	-0.058
Mean CV, by quartile, zero to mean price	27.6	34.7	42.0	46.4

Source: Table 3, and author's calculations

The demand for secondary education is somewhat different. While there is little direct gender bias against girls, as in the primary estimates, being married and female has a significantly negative impact on the probability of attending school. In addition, having a household head who is older and better educated also increases the probability of attending secondary school, unlike the primary estimates. Living in a household with large numbers of young children reduces the probability of attending secondary school, but having a large number of secondary school-age household members actually increases it.[20] The quality variables that matter are usually different in the case of secondary schooling. If the local secondary school requires a larger number of textbooks, and if it has a high repetition rate, children are more likely to attend. Thus, both of these can be taken as positive quality indicators.

The t-statistic on the log of net income is higher in the secondary estimates, though still not significant at conventional levels, indicating that demand at this level is also insensitive to price and income effects. Nevertheless, as Table 3 shows, the elasticity does vary somewhat across the expenditure distribution, as do average compensating variations, with the wealthier quartiles enjoying much higher valuations for public secondary schooling than the poorer ones.

Table 4 tests for stochastic dominance in the same way as the previous section, using both the 0/1 method of that section and the compensating variations estimated here. Note that only rural households can have a positive entry in both cases, so that the results are comparable. The compensating variations are calculated for a price increase equal to national average of the difference between the school fees (tuition and PTA costs) in private schools vs. public schools. That is, I simulate a removal of the public subsidy to education. This measure is, admittedly only

[20] Note that I excluded the child in question when calculating these household composition variables, so this cannot be due to the presence of the child.

a rough proxy for what the government actually spends to provide subsidized education in rural areas, but lacking cost information, it is the best that I can do at this point. The values are 249 and 220 nuevo soles per year for primary and secondary school, respectively, at June 1994 prices.[21]

Table 4 – Dominance test for public schooling in Peru, binary and CV methods

		(1)	(2)	(3)	(4)	(5)	(6)
(1)	Primary, binary, rural only					D	D
(2)	Primary CV from Table L1					D	D
(3)	Secondary CV from Table L1						D
(4)	Secondary, binary, rural only						D
(5)	45-degree line						D
(6)	Household expenditures						

		(1)	(2)	(3)	(4)	(5)	(6)
(1)	Primary, binary, rural only			D	D	D	D
(2)	Primary CV from Table L1			D	D	D	D
(3)	Secondary CV from Table L1					D	D
(4)	Secondary, binary, rural only					D	D
(5)	45-degree line						D
(6)	Household expenditures						

Source: Table 3, and author's calculations

For primary school, the concentration curves and extended gini coefficients (not reported here) are very close, regardless of method, and, more importantly, all dominance results are the same whether we use the simple 0/1 approximation or the estimated compensating variations, a result that echoes those in Younger (1999). Thus, for primary schooling, the demand estimates are not necessary for the TR comparisons that I make in this paper. For secondary school, however, the change in methods matters. By the dominance tests, secondary schooling is per capita progressive (in rural areas) using the compensating variations, but not when using 0/1. The extended gini coefficients are also significantly lower for secondary schooling measured with compensating variations. In both cases, however, primary schooling remains significantly more progressive than secondary schooling.

Because the compensating variations are expressed in money terms, it is possible to add them to household expenditures to calculate poverty levels with and without the subsidies associated with public schooling. (This is not possible using the simple use/no use of the basic benefit incidence.) Table 5 shows the FGT poverty measures, for rural Peru only, with and without the estimated compensating variations associated with subsidies to primary and secondary school. Despite the very progressive distributions observed using either method, the impact on rural poverty of these subsidies is minor. The headcount with primary school benefits

[21] The exchange rate in June, 1994 was 2.19 nuevo soles per US dollar.

is only one percentage point lower than that without. Although the higher order FGT measures do decline somewhat more, they remain minor changes overall. This largely because the subsidy amounts are small, between one and two percent of annual household expenditures, and so can have little impact on overall welfare levels.[22] Given the relative importance of these two items in the government's budget, and their relatively high progressivity, it seems unlikely that the entire range of social expenditures in Peru have much poverty impact overall.

Table 5 – Changes in FGT poverty measures due to benefits perceived from public school attendance, rural areas only in Peru, 1994

FGT theta value	Baseline expenditure	Plus primary CV	Plus secondary CV	Plus both CVs
0	0.7558	0.7434	0.7446	0.7285
1	0.3511	0.3240	0.3348	0.3081
2	0.2007	0.1753	0.1872	0.1632

Source: Author's estimates, based on ENNIV 1994 and Table 5.

Notes: the "Baseline expenditure" column is the FGT measures for household expenditures per capita in the 1994 ENNIV survey. "Plus primary CV" is for the baseline plus the compensating variation associated with a reduction in subsidies to public primary school tuition equal to the difference in tuition and fees between public and private schools in Peru. "Plus secondary CV" is similar for secondary schools, and "Plus both" includes both compensating variations.

CHANGES OVER TIME: MARGINAL VS. AVERAGE BENEFIT INCIDENCE

One of the criticisms of standard benefit incidence methods is that they describe the existing distribution of beneficiaries for a given public expenditure, but not the distribution of marginal benefits from a small change in that expenditure. This has been termed "average vs. marginal benefit." For policy makers interested in small changes from the status quo, it is the latter that is more interesting. The "average vs. marginal" terminology is somewhat misleading. There are in fact many margins along which policy can change. Consider a small increase in public spending on primary schools. If the change is a small reduction in tuition or fees, then the benefits will be distributed, to a first-order approximation, in the same way as existing benefits, so that the standard benefit incidence does provide an estimate of the distribution of marginal benefits in this case. On the other hand, looking at the existing distribution of primary school students tells us nothing about the benefits of a program designed to expand coverage to those not presently in school. It is this latter point that critics such as Lanjouw and Ravallion (1998) have focused on when considering average vs. marginal benefits.

[22] In comments on an earlier draft, Francois Bourgignon has pointed out that if families are liquidity constrained, which seems quite likely, the future benefits of education may be more than the families' current willingness to pay for schooling, so that a current subsidy to education may reduce future poverty more than it reduces current poverty. This, in fact, is the common notion that most people have about education and poverty reduction: today's children will be richer adults if they receive an education. Needless to say, modeling this intertemporal effect is a daunting task, unlikely to be addressed with existing cross-sectional datasets.

In this section, I take up the issue of the marginal benefit of expanding program coverage, the issue where a traditional benefit incidence study is most likely to err. I do this by looking at how both changes in program coverage and the distribution of benefits vary over time, using the four ENNIV surveys. These surveys represent repeated cross-sections of living standards in Peru, during the macroeconomic collapse of the late 1980s, the subsequent adjustment program, and the more recent economic recovery. Throughout this period, public expenditures and the coverage of various public services varied substantially. A negative correlation between program size and the concentration of its benefits gives an indication that the program probably involves "early capture" by the better-off will suggest that, on the margin, expanding the program will have a more progressive effect than that indicated by the concentration curve for existing benefits, and vice-versa for a positive correlation.

The ENNIV surveys are different than the ENAHO survey used in the previous section. The ENNIV has its roots in the World Bank Living Standards Measurement Survey, while the ENAHO is more similar to a CEPAL-like labor market survey. The most important difference between the two is that, unlike ENAHO, ENNIV includes a consumption module, so that one can estimate household expenditures. Thus, in changing surveys, I also change welfare measures. This raises questions about whether the differences between income and expenditures might yield different results, and also whether changes in the measured consumption aggregate over time might affect the results. On the first concern, cross-section results from individual ENNIV surveys rarely contradict the results found in the ENAHO survey reviewed above, particularly in the more recent years. On the second, I have constructed each of the four expenditure aggregates with a view toward making them as consistent with each other as possible.[23]

It is possible, though tedious, to repeat the above single-survey analysis for each of the ENNIV surveys. Instead, I will concentrate on making intertemporal comparisons of the coverage and progressivity of public services. Neither the 1985 nor the 1991 survey covered the entire nation,[24] so the different surveys do not cover the same population. To make the intertemporal comparisons accurate, I mostly limit them to the households that are found in the 1991 sampling domains. This is a more urban, higher income population than the entire country, so changes that we observe in these areas alone may not reflect those for all of Peru, especially when considering programs or services whose geographic coverage has changed substantially over time. I could avoid this by ignoring the 1991 data, but that survey came at an important point in time. Peru experienced extremely high inflation in the late 1980's, reaching 400 percent *per month* in August of 1990, when the government changed. The new government undertook a severe macroeconomic adjustment program immediately upon taking office, so the 1991 data capture a very interesting point in time, coming just on the heals of major macroeconomic stabilization.

[23] Appendix 2 gives information on this process.

[24] The 1985 survey did not include the departments of Ayacucho, Apurímac, and Huancavelica, which include about six percent of the population of Peru. The 1991 survey also did not include these departments, and also excluded the domains of the rural coast, the central urban coast (except Lima), and the jungle. These areas comprise about 30 percent of the population of Peru. In an earlier version of this paper, I compared results for the different sampling domains in the 1994 survey. The differences between the 1985 sampling domains and the entire country were minor, but results differed quite a lot when comparing the entire nation to the 1991 domains.

Thus, it seems worthwhile to include these data, and accept the consequent restrictions on the populations that I consider.

SETTING THE CONTEXT – Macroeconomic Changes

The period spanned by the ENNIV surveys (1985 to 1997) was tumultuous indeed in Peru. During the early 1980s, Peru suffered a variety negative shocks, including falls in the prices of its main exports, the 1982 debt crisis, the 1983 El Niño rains, and the need to restore macroeconomic balances left far out of line by the military government that left office in 1980. In response to these shocks, the Belaunde government, the first elected government in eleven years, applied mostly standard macroeconomic policies, including fiscal retrenchment. While mildly successful at the macroeconomic level, the measures were very unpopular, setting the stage for Alán García's victory in the 1985 presidential election. García pursued policies that have been labeled "heterodox" or "populist." These included significant expansions in public spending, financed by printing money, a wide variety of quantitative controls on imports, and widespread price controls. While the boost in aggregate demand caused rapid growth in 1985 and 1986, the gains were reversed in the subsequent three years as macroeconomic imbalances brought the boom to an end. By the end of the García government, in 1990, inflation was extremely high, real public spending was falling fast as government revenues (including the inflation tax) contracted, and most measures of living standards were significantly below 1985 levels.

The Fujimori government returned to orthodox macroeconomic policies in August of 1990, with a huge devaluation, major fiscal retrenchment, widespread privatization, and a general return to market-oriented policy. These policies, too, were very unpopular, but they were quite successful at restoring macroeconomic balance. And unlike Belaunde, the political damage associated with the adjustment policies was not sufficient to prevent Fujimori's reelection five years later.

While most people associate the 1990 "shock" with substantial declines in public spending on social services and anti-poverty programs, the truth is, these items had been falling for many years. Figueroa (1995) finds that, except for a sharp increase in 1986, real per capita social spending had been declining steadily during all of the 1980s (Table 6). For the 1990s, Shack (1998) finds that social spending was stable in the early 1990s, and then rose substantially. Whatever the causes, there have clearly been very large changes in public spending on the social sectors. To some extent, this reflects variations in the share of government spending in GDP, which declined during the crisis, and more so during the adjustments of 1988 and 1991. Nevertheless, most of the variation seems to be due to changes in real GDP itself: government resources collapsed with the collapsing economy, and recovered with the economy after the stabilization program. The share of these resources dedicated to social spending appears to have varied little.[25] Thus, much of the story of social spending is macroeconomic: the severe crisis of the late 1980s and the subsequent recovery are reflected in substantial changes in public social sector expenditures.

[25] Unfortunately, the government stopped classifying its expenditures by sector in the late 1980s, so simple calculations of social sector spending over the total are not possible. Shack (1998) put together the series that I use in Table 23 for the 1990s by painstakingly reviewing each budget item and classifying it himself. Figueroa (1995) finds that the share of social sector spending in total spending was reasonably stable during the 1980s.

Table 6 – Public social spending indicators for Peru

Year	Real government social spending per capita[1/]	Government Spending / GDP	Percent change in real GDP per capita	Inflation
1981	118.5	18.2%	2.7%	72.7%
1982	104.0	17.0%	-2.3%	72.9%
1983	91.3	18.8%	-15.2%	125.1%
1984	95.8	17.5%	2.2%	111.4%
1985	92.6	16.3%	-0.5%	158.3%
1986	120.4	15.7%	8.5%	62.9%
1987	95.3	16.5%	8.2%	114.5%
1988	87.1	12.9%	-9.9%	1722.3%
1989	78.6	14.0%	-14.1%	2775.2%
1990	50.2	15.4%	-6.7%	7649.7%
1991	38.4	11.5%	1.1%	139.2%
1992	36.7	14.8%	-3.1%	56.7%
1993	60.4	14.6%	4.6%	39.5%
1994	76.0	16.1%	11.2%	15.4%
1995	92.8	17.6%	5.4%	10.2%
1996	94.4	15.9%	0.8%	11.8%
1997	96.0			
1998				

1/ Index, 1980=1. This series uses Figueroa's (1995) data up to 1989, and Shack's (1999) thereafter. I reflated the original Figueroa data with the CPI, and then deflated with Escobal and Castillo's geometric price index. I then scaled Shack's data to match Figueroa's in the overlapping years.

SETTING THE CONTEXT – Sector level policy

Like most developing countries, education and health dominate social spending in Peru, although there have been a variety of other anti-poverty programs as well. Education accounts for 60 to 65 percent of social spending, health 25 to 30 percent, and the rest goes mainly to food programs. The economic collapse of the 1980s brought with it the disappearance of many social programs as the government could not afford to maintain them. In turn, the recovery of the 1990s saw the initiation of new programs. At first, these programs aimed to provide a safety net during the stabilization program, concentrating on food programs. The *vaso de leche*, which distributes a glass of milk and a biscuit or a grain-based porridge with similar nutritional content to school-age children, was introduced during the crisis, as were *comedores populares* and *clubes de madres*, both schemes that bring families together to share the costs of meals, with some subsidy for buying food from the government (and many NGOs as well).

Health policy saw a substantial change during the 1990s. On the one hand, the government began to charge user fees for consultations at public health clinics and hospitals, despite evidence that this policy is regressive (Gertler, Locay , and Sanderson, 1987). Yet at the same time, the government has built many new health centers in remote areas where the users are likely to be poor. In education, the most important policy change has been the construction of schools in underserved areas, often funded by FONCODES, and the reconstruction of schools that had suffered during the crisis. Unlike health, education remains free of tuition charges.

COVERAGE RATES FOR PUBLIC SERVICES

Tables A23 to A25 give the coverage rates for several public services for which we have data in most or all of the ENNIV surveys. The left side of the tables is restricted to the households in the 1991 sampling domains, while the right side is for the entire sample of each survey. Over the entire 1985-1997 period, coverage of public utility connections increased substantially, and the gains were largest in the poorer quintiles (Table A23). This pattern is consistent with the early capture of services by wealthier households, but it is also influenced by the substantial rural-to-urban migration that took place during the period. The share of the population living in rural areas declined from 35 percent in 1981 to 30 percent in 1993, and to 28 percent in 1997. Since it is easier to provide utility connections in urban areas, this movement facilitated the observed increases. In some instances, the observed changes may reflect different income elasticities of demand across the welfare distribution. As incomes declined in the late 1980s and early 1990s, poorer people may have been more likely to cancel their services, particularly those that include a significant fee (telephones and electricity). Despite the general increase in coverage, the early years of the Fujimori government (1991-1994) show declines in utilities connections, some of which are quite large for poorer households. This is the period following the “shock” macroeconomic adjustment, when government spending was strongly curtailed.

In education, I consider the percent of children not attending school, because assignments of public vs. private are incomplete.[26] As noted in the ENAHO survey, almost all children attend primary school in Peru, although attendance rates did increase substantially between 1985 and 1991, especially in the lower quintiles. Despite concerns that the crisis and adjustment had caused some parents to withdraw their children from school, the effect seems to have been small, limited to a two percent increase in non-attendance in the first and, curiously, the fifth quintiles between 1991 and 1994. This was subsequently reversed, so that by 1997, there is no clear pattern of non-attendance across the expenditure distribution. At the secondary level, however, there is a clear increase in non-attendance from 1991 to 1994, but it does not appear to be related to households' economic welfare: the only quintile that does not show an increase in non-attendance is the poorest, and the increases in the top two quintiles are larger than in the third. All of these are also strongly reversed in the 1994-1997 period. Attendance at post-secondary institutions is more stable over time, although it did fall significantly in the 1985-1991 period, with the higher quintiles contributing more to the decline.

Even though the public/private data are incomplete, the data that do exist suggest that the share of primary students going to a public school remained fairly constant over the period, the share for secondary students increased, and that for post-secondary students declined.

Table A24 presents only the share of the total population that did not have a health consultation, regardless of provider. As with secondary schooling, coverage does decline somewhat during the adjustment period (1991-1994), though the number is not dramatic, and the decline is reversed after 1994. Interestingly, the increase in the share of people who did not receive a *free* consultation rises by less than the number not receiving a consultation. This may simply be due to the fact that visits to the IPSS system remain free, but it may also reflect public clinic's use of their discretion to lower fees to some patients.[27] But in general, there does not appear to have been a dramatic reduction in free services over the period.

Finally, there is one social service that we can compare over time, the *vaso de leche* program. This is an explicit anti-poverty program, and it has grown rapidly during the past decade (Table A25). It is interesting that this program began with higher coverage in the poorer quintiles, unlike any other that we have reviewed, and that as it grew, coverage improved proportionally more among the richer quintiles than the poorer. Thus, this may be an example of a program with early capture by the poor rather than the rich.

RELATIVE PROGRESSIVITY OF SOCIAL SERVICES OVER TIME

Figures A8 to A17 present concentration curves for social services and programs that are comparable over time in Peru. Tables A26 to 28 show the corresponding dominance tests. Both the figures and the tables are based on households in the 1991 sampling domains. While the observed change in each service may have its own story, the remarkable macroeconomic

[26] The skip pattern of the questionnaires is such that any student currently in school who has not previously passed a grade does not report his/her school type (public or private). This leaves out many primary and pre-primary students. These students are excluded from the incidence calculations that follow.

[27] Unfortunately, the earlier surveys do not distinguish between "hospitals" or "health centers" that belong to the IPSS system vs. the Health Ministry system.

fluctuations over the period are a common, and one has to believe, important factor. This substantial fluctuation in incomes should, in theory, have different implications for different services. For those where users both incur some of the costs (including opportunity costs, such as lost labor time while in school) *and* have an option to use the service or not, this income effect alone should lead to less progressive distributions. This is because some relatively poor people who chose to use public services (and bear their share of the costs) at higher incomes will stop doing so when their income declines. At the same time, some relatively wealthy people who previously chose to use (higher quality, more expensive) private services will now chose public ones. Public services that have some absolute screening mechanism, such as transfer payments that require incomes below a certain amount, will also have a less progressive distribution in a crisis, because more people in the middle of the welfare distribution will qualify. For these types of services, then, we should see a pattern of greater progressivity in 1985, less in 1991, with 1994 and 1997 somewhere in between.[28]

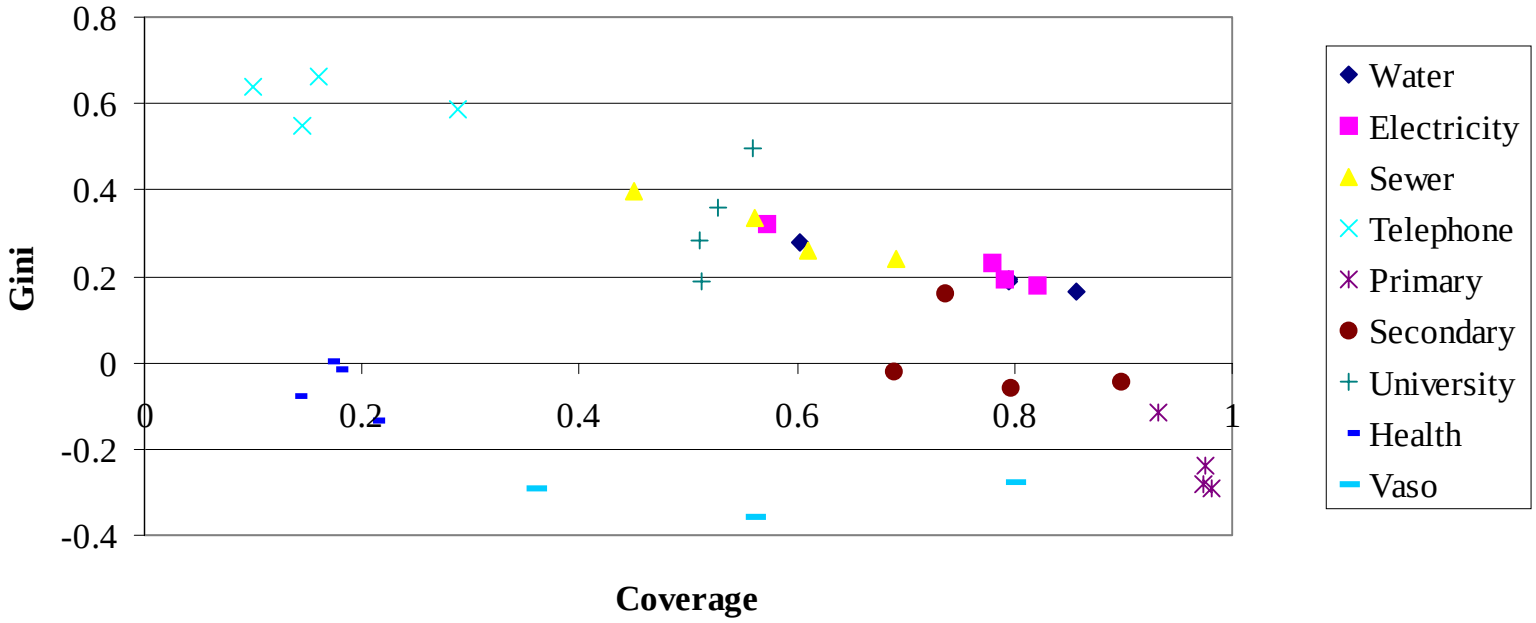
The results do not bear this hypothesis out. If anything, it seems that 1991 has the most progressive distributions of benefits from public services. The most striking thing about the tables, however, is that very few of the statistical tests are significant, even for the tests based on S-ginis. For most of the public utilities and for public schools, there is evidence that distributions were more progressive in all three 1990s surveys than in 1985, though for public water and telephone connections, this is true only when comparing S-gini coefficients. More importantly, there are almost no cases in which we can distinguish distributional differences for any of the services in the 1990s. Thus, whatever improvements in the distribution of public services and education have occurred in the past 15 years occurred between 1985 and 1991. Given the chaos of the 1989-1991 period, it seems likely that most of this improvement took place before the hyperinflation, the subsequent stabilization, and the substantial structural changes that the government pursued in the 1990s.

The fact that the incidence of many public services was less progressive in 1985, and that their coverage was also lower, lends some support to the notion that the better-off are the first to benefit from narrowly supplied public services, and the poor only get access once programs have grown (the "early capture" hypothesis of Lanjouw and Ravallion). Figure 1 examines this proposition, plotting each service's coverage[29] against its gini coefficient, for each of the ENNIV survey years. In general, there is a weak correlation in these data: regressing the gini coefficient on coverage and a dummy for each service/program[30] yields a regression coefficient of –0.27, with a t-statistic of -1.82. For public utilities, the correlation is much stronger, with a regression coefficient of -0.50 and a t-statistic of –5.41. For these services, the generalization fails only for the large increase in connections to the public water system observed between 1985 and 1991, without a corresponding dominance result, and for telephones, where coverage remains narrow, despite large increases, and where a substantial subsidy was removed with the privatization of telephone services. In education, the coverage numbers for secondary school vary substantially,

[28] On the other hand, some services that are either costless to maintain or (nearly) permanent, such a connection to the water and sewer lines, are unlikely to change much despite the crisis.
[29] For education and health, coverage is coverage of all services, not just those in the public sector.
[30] There is no reason to believe that each program should have the same intercept, even if the negative correlation implied by the early capture hypothesis is true.

suspiciously so, in the 1990s, without corresponding changes in progressivity, and post-secondary schooling becomes more progressive despite (slightly) lower coverage between 1985 and the other years. In health, there are neither large changes in coverage nor progressivity. Finally, coverage of the *vaso de leche* program increased substantially through the 1990s, with no change in its progressivity.

Figure 1 - Coverage rates vs. gini coefficients for public services, ENNIV surveys, 1991 clusters



AN ESTIMATE OF MARGINAL BENEFITS AS PROGRAM COVERAGE CHANGES

While the previous section compares the incidence of "average" benefits for two or more years, it is possible to estimate the marginal benefits associated with changes in overall program size using two cross sections. Let ${}_t s_j$ be the sum of benefits in year t for all people in the sample up to sample share (quantile) j:

$$ {}_t s_j = \sum_{i=1} b_i $$

and note that ${}_t s_1$ is the total benefits for the entire sample. The standard concentration curve graphs the cumulative share in total benefits up to quantile j:

$$ {}_t l_j = {}_t s_j \Big/ {}_t s_1 . $$

In the previous section, I compared two such curves for the same public program, drawn from different surveys. In an analogous fashion, we can also consider the cumulative share of the change in benefits between two surveys, or the "marginal" benefits:

$$ {}_t l_j = \left({}_{t+1} s_j - {}_t s_j\right) \Big/ \left({}_{t+1} s_1 - {}_t s_1\right). $$

The denominator is the change in program benefits between surveys for the entire sample, and the numerator is the change in benefits up to quantile j. Note that unlike the concentration curves above, ${}_t l_j$ is not bound by 0 and 1. Any quantile can have a negative share of the change in benefits if its change in benefits has the opposite sign of the total change in benefits. Similarly, any quantile could have a change in benefits that exceeds the total change. It is possible to make statistical comparisons using a variant of the covariance matrix found in Davidson and Duclos (1997).

Figure 2 shows concentration curves for the share of the change in benefits between 1994 and 1997 for seven public programs or services: primary, secondary, and post-secondary public education; health care at a public health centers and hospitals; and the *vaso de leche* program. As in the previous analyses, I measure benefit as participation, i.e. the benefit variable is 0/1. In this case, the denominator above is just the total change in program coverage, and the numerator is the change in coverage up to quantile j.[31] The curves here are much more erratic than those for "average" incidence in either 1994 or 1997, which is probably due to the fact that these are based on differences in coverage rather than its level. In fact, the most irregular curves are those with very small changes in coverage: 0.01%, -0.59%, -0.45%, and 0.35% for pre-school, primary, secondary, and post-secondary public education, respectively. This variation means that most of the curves cross, even at the lower end of the welfare distribution, making dominance relations unlikely.[32] In fact, formal tests indicate only three rejections of the null: the *vaso de leche* program and public health centers/posts both dominate the 45-degree line, indicating that an

[31] Note that these are not the same as the coverage data in Tables A.23-A.25. Coverage here is over the entire sample, not just those "appropriate" for the service in question. In addition, here I use only the use of public services, while many parts of Tables A.23-A.25 refer to service from any provider.

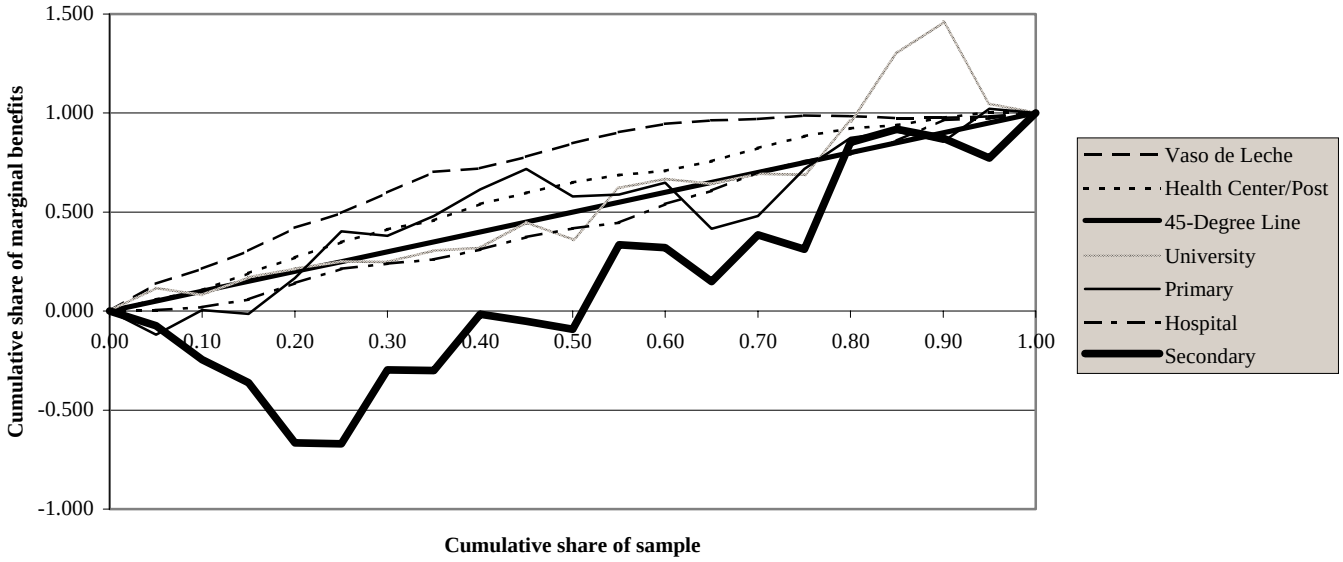
[32] The standard errors for these ordinates are also substantially larger, as in the case of Indonesia (Lanjouw, et.al., this volume).

increase in program coverage between 1994 and 1997 is per capita progressive for both. In addition, public health centers/posts dominate public hospitals.[33] These three programs also saw much larger changes in coverage over the period, 2.98%, 2.70%, and –1.71% for health centers/posts, hospitals, and the *vaso de leche*, respectively.

In terms of policy, some of the recommendations based on standard benefit incidence analysis persist here, while others get lost in erratic distribution of changes in benefits. The *vaso de leche* program remains quite progressive here, and the marginal financing for health centers and posts remains more progressive than that for hospitals. One important change is that marginal benefits from health centers and posts is now per capita progressive, making it a more attractive option than indicated by the standard analysis. At the same time, spending on primary schools may be less attractive: it is no longer per capita progressive.

[33] The *vaso de leche* program dominates both centers and hospitals over a large range of the distribution – up to 0.75 and 0.85, respectively – so that for any reasonable poverty line, we would also have dominance there.

Figure 2 - Concentration curves for marginal benefits from public expenditures, 1994-1997



DETERMINANTS OF CHILDREN'S NUTRITIONAL STATUS IN PERU

The benefits that a typical incidence study considers are private benefits, i.e. benefits perceived by the recipient directly. Yet much public spending is directed toward goods that carry significant external benefits. In general, these are difficult to identify in practice, limiting our ability to examine their distributional impact. There are, nevertheless, some cases in which we can identify external benefits with standard survey data, most commonly benefits that pass from parents to their children. In this section, we examine such benefits, using data from the 1996 Demographic and Health Survey (DHS) in Peru. DHS data are collected in many countries. The involve large samples and include a wealth of health data, including child anthropometrics. These measures, children's height and weight relative to a standardized healthy population, are interesting as alternative indicators of individual welfare. Unfortunately, the DHS do not collect income or consumption data, so they do not permit comparisons of these alternative indicators to the standard ones. But they will permit us to estimate the external benefits of a few public services.

Table 7 presents the results of OLS regressions of individual children's height-for-age and weight-for-height z-scores in Peru. In general, the regression on height-for-age, which is an indicator of chronic malnutrition, performs much better than the regression on weight-for-height, which is an indicator of acute malnutrition. This is typical of nutrition regressions. (See, e.g., Lambert and Sahn, this volume.) Most of the significant regressors in the weight-for-height regression are in the (unreported) regional dummies.

Table 7 – Effects of parents' education and access to public services on children's' nutritional status

Dependent variable:	Height-for-age		Weight-for-height	
Regressor	Coefficient	t-statistic	Coefficient	t-statistic
Cluster mean, mother saw doctor	0.131	2.17	-0.045	-0.90
Cluster mean, mother saw nurse	0.149	2.62	0.041	0.86
Cluster mean children with tetanus	0.086	1.39	-0.023	-0.45
Gender (Girl=0, Boy=1)	-0.077	-2.83	-0.038	-1.69
Mother completed primary school	0.062	1.51	0.001	0.02
Mother complete more than primary	0.296	6.15	-0.014	-0.34
Father completed primary school	0.232	3.41	0.137	2.43
Father complete more than primary	0.430	6.08	0.108	1.83
HH has flush toilet	0.311	8.60	-0.006	-0.20
HH has latrine	0.037	1.32	-0.003	-0.12
HH has piped water in building	-0.003	-0.10	0.027	1.21
Sample Size	13212		13212	
Adjusted R-square	0.251		0.106	

Note: Regressors also include an intercept; a dummy for being measured while standing (vs. lying down); region-specific dummies; the child's birth order; whether the child is a twin, triplet, etc.; the child's age; household composition; current area of residence (urban/rural); and mother's area of birth (urban/rural). The dependent variable is child's height-for-age z-score, and the regression is OLS.

Source: Author's estimates, based in DHS 1996.

One clear case of an externality is the impact of parents' education on children's nutritional status. In a traditional incidence study, the benefits of public education are attributed to the parent (the recipient of the education), yet these models show that better-educated parents have children with better nutritional status. In the height-for-age regression, both mothers' and fathers' education improves the child's nutritional status, while for the weight-for-height regression, the father's education does so. One should be cautious about interpreting this conclusion. The lack of an income regressor means that the parents' education may be proxying for income, with the resulting coefficient being an income effect rather than an education effect. However, to the extent that better education leads to higher incomes, the coefficient will capture the direct and indirect effects of better education, both of which may be considered external.

Several other variables in the regression reflect the impact of policy on nutritional outcomes, although these effects may not be externalities. Whether the mother had consultations with a health care professional, either a doctor or nurse, while she was pregnant has a significantly positive effect on height-for-age, but none on weight-for-height, consistent with the former being a measure of long-term nutrition. Thus, mothers' health care improves children's welfare. In addition, access to the public sewerage network, via a flush toilet, significantly improves children's height-for-age. Finally, note that boys are generally less well-nourished than girls, by either measure.

CONCLUSIONS

On the whole, the vast majority of public social sector programs and services are progressive, and many are per capita progressive. Thus, even though we know nothing about tax incidence, it seems likely that social spending has an equalizing redistributional effect in Peru. Nevertheless, the monetary calculations for education demand in rural areas, made on the basis of compensating variations, suggest that the overall impact on poverty of social spending is small. Even the benefits to primary education, which is a large public expenditure and whose benefits are concentrated among poorer households, decreases the poverty headcount by only one percentage point in rural areas.

Among the various programs and services that the government provides or subsidizes, the most progressive tend to fall into three categories: those that have an obvious benefit only to the poor, those that are explicitly focused on poverty reduction *and* are controlled locally, and those that have very broad coverage.[34] The most striking example of the first is adult literacy campaigns. Because no literate adult has an incentive to participate, and because illiteracy is a strong predictor of low income, this program's target population provides a simple and effective self-selection mechanism. A similar argument could be made for special health campaigns to vaccinate children or provide women with basic examinations: people that see a doctor anyway are usually better-off, and they will have received these benefits as part of their regular health care. As with literacy, they will have little incentive to take advantage of the special campaigns, so that again, the non-poor will self-select out of the program, leaving a progressive distribution

[34] Pedro Francke pointed out the latter two categories to me in comments on an earlier draft.

of benefits. Thus, a clear policy recommendation for governments that would like to use their social sector budgets to redistribute resources to the poor is to consider the possibility for useful programs that are of interest only to the poor.

The second type of very progressive program concentrates on feeding programs, particularly the *vaso de leche* program and school breakfasts. While both programs are financed centrally, control of the program, including targeting, is local. In particular, a community must form a committee dedicated to the program in question, and that committee controls (local) distribution. Even though both programs are now large, so that they might be included in the third group, evidence on the *vaso de leche* program from its early years, especially 1991, shows that even when its coverage was much lower than it is now, the program was highly progressive. Thus, the local committees charged with managing these benefits seem able to do so in a pro-poor way. This is certainly not a general conclusion, though. Public health providers are allowed to reduce or eliminate fees for poor patients, and they do so without guidance from the central government (the Health Ministry). The evidence is that they have only modest success at targeting their poorer patients. Of course, this may not represent local control, since people from outside the community may staff the clinic. But it does suggest that community control, rather than decentralized discretion, is important to good targeting. It also suggests that programs whose main rationale is poverty reduction, rather than some other social service, are more likely to succeed at concentrating benefits among the poor.

Examples of the last group include primary schooling and childhood vaccinations. More generally, there is evidence both over time, in the ENNIV surveys, and also cross-sectionally, that for many public services, what Lanjouw and Ravallion call "late capture" of benefits by the poor is the rule.[35] Evidence for this is especially clear in public utility connections (some of which are no longer public, or subsidized), but for public social spending in general there is a negative correlation between a program's coverage and its distribution of benefits (as measured by the gini coefficient). It is not clear whether this is due to political economy (the better off are better able to capture program benefits), geography (it is easier to provide public services in urban areas, where the population is better off), or some other factor. But if it is true, then it is not surprising that more comprehensive programs are better targeted to the poor. This is especially true in a field like education, where private providers are an alternative for wealthier households, thus removing them from the group of beneficiaries.

With the suggestion that program size matters in many cases, it is heartening to see that coverage of most social programs is higher today than it was in 1985, but progress has not been uniform. Coverage in the areas of the country covered by the 1991 ENNIV survey increased substantially for public utilities, marginally for education, and not at all for health services. The ensuing post-crisis years saw a general stagnation, with reductions in coverage for some services, especially in the poorer deciles. Only by the last ENNIV in 1997 do we see clear improvements over 1985 in all cases. Certainly for public expenditures that respond to a clear externality, increasing coverage is an important policy goal on efficiency grounds. In the case of Peru, the

[35] Lanjouw and Ravallion's terminology suggests that small programs are new, and that they only grow over time. This is not necessarily the case. The data from program coverage from the ENNIV, for example, shows substantial declines for some public services between 1985 and 1991. Instead, the point is the negative correlation.

fact that "late capture" by the poor is the rule suggests that increasing coverage is an important equity goal as well.

Another policy-relevant observation is that the distribution of quality characteristics of public services is less pro-poor than the services themselves. Thus, attendance at a public primary school is concentrated among the poor, but available measures of the quality of schooling are less so. An implication is that efforts to provide the same quality education to all public school students, and the same quality health care at all public centers and posts, would be strongly pro-poor.

Given the large variations in program coverage and the macroeconomic environment from survey to survey, the most remarkable thing about the intertemporal comparisons of benefit incidence is how little it varies. Apart from the general conclusion that the distributional consequences of almost all public services improved between 1985 and the 1990s, we find very few statistically significant differences in benefit incidence. This is all the more surprising because the government has made a substantial effort to expand access to public schools and health posts, especially in rural areas. In fact, Paxson and Schady (1999) find that the distribution of benefits from FONCODES, one of the major funders of such infrastructure development, is highly progressive. Taking the two results together suggests that FONCODES good targeting is more a result of subsidizing public services that are already progressive rather than making existing services more progressive.

The relative stability of programs' concentration curves over time, and the similarity of cross-section dominance results for the different surveys available in Peru, should give some encouragement doing incidence analysis in countries where only one survey is available. The distributional patterns that we observe seem to be reasonable stable, so that lack of data at many points in time may not be a substantial impediment to obtaining a good description of the incidence of public social spending.

In trying to assess the progressivity of particular public expenditure items, one must be careful in jumping from the descriptive information presented in this paper to policy conclusions. The results here provide robust descriptions of who is benefiting from public programs and services, but they say very little about many policy reforms of interest. In particular, the "average incidence" that we observe will correspond precisely to the marginal incidence of a policy change only if that policy somehow changes benefits proportionally. For some policies, this is straightforward: a small change in a service's price will have distributional consequence that are similar to the existing distribution of benefits. Other changes, however, could be distributed quite differently. For example, education spending dedicated to expanding access to schools by design affects a different population than existing beneficiaries, so that the information on current students that I use in this paper is not a good measure of such a policy's impact.

What one can say safely is that many of the distributional patterns for existing benefits that I find in Peru do not differ from those in other countries. In particular, spending in primary schooling is more progressive than that for secondary, which in turn is more progressive than that on post-secondary. In health, spending on centers and posts (non-hospital care) is more

progressive than that on hospitals, even when limiting our attention to consultations. Thus, to the extent that the government wants to make spending more progressive, and to the extent that it can change benefits in proportion to the existing pattern, redirecting public spending towards primary education and primary health care makes sense.

In addition to these now standard results, the richness of the available data in Peru offer some further insight into the possibilities for progressive targeting of public spending. Adult literacy education is an interesting example of a program design that includes a natural self-selection mechanism. Special health campaigns directed at the under-served may be another. Such programs do not have to be large to be highly progressive, although they do need to provide a service that is of little interest to the non-poor, a restriction that probably impedes use of this strategy for a large-scale poverty reduction effort. Results on feeding programs are also encouraging. While some of these now reach many Peruvians, even small programs such as the *vaso de leche* in 1991 and the child-oriented feeding programs highlighted in the ENAHO survey are highly progressive. In each of these programs, there is a large degree of local control that is outside the regular political structure. While the evidence in this paper is only a beginning, it does suggest that this sort of program structure is conducive to good targeting.

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Appendix 1

Variable definitions for ENAHO 1998-II

This appendix defines all the variables from the 1998-II ENAHO survey used in the paper. It makes reference to the source of the data question number in the questionnaire.

Education

The education questions are asked of (or about) all people over the age of three in the households surveyed.

Variables for attendance at a public school come from question 305-C, "What grade or year does _____ attend?" The result is a 0/1 variable. For the incidence analysis, the variable is one only if the school is public. All post-secondary education (university, technical, and post-graduate) is grouped together.

Variables for school quality come from questions 307, "In the past 3 months, from _____ to _____, has _____ received free from the school: health service, dental service, school breakfast?"; 307-A, "In the past 3 months, from _____ to _____, has _____ received free services from the school insurance program?"; 308, "Does the school that _____ attends have: public water, public sewer, electricity, nurse's station, a playground or gymnasium?"; and 312 "How does _____ go to school: …public bus…" In all cases, the result is a 0/1 variable, even though the question 307-A includes information on number of health and dental consultations, and number of school breakfasts. In practice, the numbers are so similar across all beneficiaries that the concentration curves are identical for the 0/1 variable and the variable that accounts for frequency. For the incidence analysis, these variables are one only if the student's school is public.

The variable for attendance at an adult literacy course comes from question 304, "In the past two years, from _____ to _____, has _____ participated in a literacy program?" The variable is 0/1, and the program is assumed to be public.

Health

The questions about health care are asked of all people in the households surveyed, but most questions in this section of the survey are answered only if the person reports having been sick in the past three months.

The type of service is determined by question 402, "Where did the consultation take place?" Options 1 and 2 (communal URO and MINSA center or post) are aggregated to MINSA non-hospital, as are options 3 and 4 (IPSS post or policlinic, PAAD-IPSS office). All variables are 0/1.

If the respondent reports that his/her medical service was "donated by the government" in question 403, then the variable for free service is also one. Otherwise, it is zero.

Women's and children's preventative health care

Data on pap smears and breast cancer exams come from question 423, "In the past year, from _____ to _____, have you had a pap smear and/or an exam for breast cancer? Where?" This variable is 0/1, with the source (MINSA, IPSS, etc.) identified by the columns in the question.

Data on child well visits (*control de crecimiento y desarrollo*) come from question 422, "In the past year, from _____ to _____, how many times did you take your child(ren) under six years old for a well child visit, and where?" This answer can have any non-negative integer value, although the vast majority are zero or one. The sources (MINSA, IPSS, etc.) are identified in the columns of the question.

Data on childhood vaccinations come from question 420, "Did your last child born receive the following vaccinations: tuberculosis, polio, DPT, measles?" I use only the yes/no answer, not the dosage reported. Only mothers with children under six years old answer this question. The source comes from question 421, "Where did s/he receive the vaccination?"

Miscellaneous social benefits

This information comes from section 700 of the survey. Unlike other sections, there is only one question per household, not per person, which may change the incidence of the response substantially if households that have at least one beneficiary tend to have many beneficiaries.

The variables come from question 701-A, "In the past 3 months, from _____ to _____, have you or some member of your family benefited from: <list of services>?" The variables are 0/1. While the following question asks about the source of the service, with a long list of possible public and private institutions, in fact, many people answered "don't know," or gave answers that are not consistent with the program, e.g. attributing the benefit of a program run by the Education Ministry to the local government. Because of this problem, I ignore the source data.

Household income

The welfare variable I use is a modification INEI's quarterly household income multiplied by four. (See INEI, 1999). The INEI variable includes net monetary income, payments in kind, and own-consumption, for each respondent's first and second activities. From this, I subtract three items included in net monetary income: extraordinary income (insurance receipts, inheritance, gambling winnings, and "other"), the value of additions to a house, and withdrawals from banking accounts. The latter two are clearly capital transactions, not net income, while the former does not correspond to a notion of permanent income.

Appendix 2

Construction of Comparable Expenditure Aggregates in the Various ENNIV Surveys

	1985	1991	1994	1997
Housing				
Survey section(s)	2b	2b	2b	2b
Dataset name	f2b1, f2b2	n02b	reg04	reg-05
Recall period	Last pymt made (no date)	Last pymt made (dated)	Last pymt made (dated)	Last pymt made (dated)
Variable name(s)	s02b_15, s02b_24, s02b_26, s02b_28, s02b_30	watpmt, elecpmt, mcostful, telpmt, mothpmt	d10a, d17a, d19a, d21a, d22a, d23a	d9a, d12a, d14a, d18a, d20a, d21a, d22a
Notes	1 - d22a in 1994 and d20a and d2a in 1997 are not in other surveys. Create variables with and w/o it for comparability 2 - In all cases, you'll need to estimate hedonic models for rent to substitute. Do these separately by regions/areas or domains. Note that this requires information from the 2a dataset, too.			
Education				
Survey section	3a	3	3	3
Dataset name	f3a2	n032	reg06	reg-07
Recall period	various (1 to 12 months)	last school year	last school year	last 12 months
Variable name(s)	S03A220A- S03A220H	TUITION, BOOKS, UNIFSUPP, TSCHEXP	f13a-f13d, f14	f10a-f10e
Notes	1 - for *matriculas* and *contribuciones*, we should deflate with the starting month of the school year. We could do this arbitrarily, or use information on the date of matriculation in the 1991 and 1994 surveys. 2 - because of the different recalls in 1985, this is not strictly comparable. 1985 probably misses some expenses. 3 - for 1991, 94 and 97, use either the total (TSCHEXP, f13d) or the sum of the other three. Don't add all four items together.			
Survey section	3b	3	3	
Dataset name	f3b	n032	reg07	
Recall period	various (1 to 12 months)	last school year	last school year	
Variable name(s)	S03B_02A- S03B_02H	NURSTUIT, NURSOTH	g30, g31	
Notes	Same notes as above. 1997 appears to include pre-school in the regular section (age 3 and up), unlike previous surveys			
Health				
Survey section	4	4	4a	4
Dataset name	f4	n04	reg08	h11a, h11b, h12, h15, h19
Recall period	four weeks	four weeks	four weeks	
Variable name(s)	S04_10, S04_13, S04_15, S04_17	COSTC, COSTH, COSTMED	h11, h14, h17	
Notes	1 - Should not deflate S04_17 (1985) as it asks for current value. 2 - From the skip patterns, it looks like 1985 is comparable *including* S04_17. 3 - H12 is included only in 1997. Exclude from the aggregate			

	1985	1991	1994	1997
Employee Fringes				
Survey section	5b	5b	5b	5b
Dataset name	f5b2, f5b3	n05b2	reg13	reg-14
Recall period	(various; survey indicates)	(various; survey indicates)	(various; survey indicates)	(various; survey indicates)
Variable name(s)	S05B221A, S05B223A, S05B225A, S05B226A, S05B228A, S05B230A, S05B232A	VINKB2, VOINKB2	M11B, M12B	m11b, m12b
Notes	1 - In all cases, you have to calculate how long they've worked at the job, assume an even frequency of benefits according to what's reported in the survey, and then deflate at each calculated date that they received a benefit. 2 - **You have to repeat this same calculation for all four jobs reported, - sections 5c, 5e, and 5g (5f in 1994).**			
Consumption from Stocks				
Survey section	10a2	7a	7a	7a
Dataset name	ntrps	n07a2	REG28	reg-24
Recall period	last month	last month	last month	last month
Variable name(s)	S10A_43	VHMCNSLM	ab18	w19
Notes	1 - The 1994 and 97 surveys asks the question only if the firm operated in the past month. To be consistent, we should use the same screen on the other surveys, even though they include information on any firm operating in the past year. 2 - No survey has frequency information for consumption out of stocks, so assume each month is the same as last one.			
Daily non-Food				
Survey section	11a	8a	8a	8a
Dataset name	f11a	n08a	REG30	reg-26
Recall period	two-visit (use survey dates)	15 days	15 days	15 days
Variable name(s)	S11A_101 - S11A_107 and S11A_109	EXPD_I	ad03	z03a, z03b
Notes	1 - 1991 has expenditures in dollars and intis (EXPD_D and _I), which does not correspond to the questionnaire. Look at the data to see if this is a simple conversion or if they've recorded in separate currencies. 2 - item 108 in 1985 is medicine, which we pick up in section 4. The other surveys exclude it. 3 - item 109 in 1997, use of public telephone, is not in other surveys 4 - 1985 has different variables for each expenditure, while others are stacked, with product codes. 5 - 1997 includes both purchases and own-production. No other survey has the latter.			

	1985	1991	1994	1997
Semi-Durables and Services				
Survey section	11b	8b	8b	8b
Dataset name	f11b	n08b	REG31	reg-27
Recall period	3 months	3 months	3 months	3 months
Variable name(s)	S11B_115 - S11B_135, except S11B_124	EXPD_I, except code 124	ae02, except codes 124, 126	aa02a,aa02b
Notes	1 - 1985 has different variables for each expenditure, while 1991 and 1994 are stacked, with product codes. 2 - The 1991 and 1994 surveys ask for the month of the expenditure, while 1985 doesn't. It seems best to deflate them all the same way (assuming equal expenditure over the period). 3 - Item 124 is medicine, which we pick up elsewhere. 4 - The 1997 survey reshuffles products and adds/subtracts products. Be careful in specifying comparable aggregates. 5 - The 1997 survey includes both purchases and own-production (two variables).			
Durables Depreciation				
Survey section	11c	8c	8c	8c
Dataset name	f11c	n08c	REG32	reg-28
Recall period	n.a. (survey has purch. date)	n.a.	n.a.	n.a.
Variable name(s)	S11C_04, for all S11C_01	VALUE_I, times NGOOD, select on GOODCD	af03 times af02, select on af01a	ac4
Notes	1 - 1991 thru 1997 each add additional assets, though all surveys have an "other" at the end. It's not clear whether this would pick up the left-out assets in earlier surveys, but 1985 has 19.5% of "other, 1991 has 13.6%, and 1994 has 12.8%. 2 - 1991 and 1994 don't have the purchase date, so you need to use a % of current value for depreciation.			
Tranfers				
Survey section	11d	8d	8d	8d
Dataset name	f11d	n08d	REG33	reg-29
Recall period	one year	one year	one year	one year
Variable name(s)	S11D_02A, annualized with S11D_03A, and S11D_03B	AMTRNS_I, annualized with NTL12M and FRTRNSF	AH02, annualized with AH03A and AH03B	
Notes	1 - In 1985, use only items (S11D_01) 1 and 6. The others are more like savings, transfers or taxes, and "others" is not in the other surveys. 2 - In 1991, use only items (TRANSFCD) 1, 5, and 6. 3 - In 1994, use only items (AH01) 1, 5, 6, and 7. 4 - In 1997, use only items (AD2A) 1, 5, 6, and 7.			
Food				
Survey section	12a, 12b	9a, 9b	9a, 9b	9
Dataset name	foods	n09a, n09b	REG35, REG36	reg-30
Recall period	two-survey recall	15 days	15 days	15 days
Variable name(s)	S12A_03 and S12B_03	FDEXP_I and SFDEXP_I	AJ04 and AK03	ae4, ae5

Notes	1 - These are stacked files, so you have to sum over households. The questions are identical. 2 - See World Bank's comments on the problem of including a "total" question for food consumption in 1997

Appendix 3

Auxiliary Tables

Table A1 - Coverage rates for school attendance, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
Pre-Primary						
Public	0.51	0.53	0.53	0.49	0.45	0.51
Private	0.01	0.01	0.03	0.14	0.31	0.07
Primary						
Public	0.95	0.94	0.92	0.82	0.64	0.89
Private	0.00	0.02	0.06	0.17	0.36	0.08
Secondary						
Public	0.65	0.79	0.80	0.76	0.53	0.72
Private	0.01	0.03	0.07	0.10	0.27	0.09
Post-Secondary						
Public	0.10	0.22	0.27	0.28	0.25	0.24
Private	0.02	0.04	0.06	0.16	0.25	0.13
Literacy Campaign	0.11	0.11	0.08	0.05	0.05	0.09

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of eligible children, where "eligible" is defined as (1) attending school at this level, or (2) being of the correct age for this level and not attending another level.

Table A2 - Coverage rates for pre-primary school characteristics, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
Child's school has water connection						
Public	0.39	0.51	0.77	0.81	0.83	0.59
Private	0.88	1.00	1.00	0.98	1.00	0.99
Child's school has sewer connection						
Public	0.19	0.42	0.71	0.79	0.78	0.48
Private	0.88	1.00	0.75	0.96	1.00	0.96
Child's school has electricity connection						
Public	0.25	0.56	0.76	0.77	0.84	0.55
Private	0.75	1.00	0.83	0.98	1.00	0.97
Child's school has nurse's station						
Public	0.05	0.08	0.13	0.17	0.17	0.10
Private	0.50	0.29	0.17	0.31	0.51	0.41
Child's school has playground or gym						
Public	0.36	0.47	0.60	0.60	0.57	0.49
Private	0.75	0.57	0.67	0.60	0.63	0.63
Child received at least one dental visit						
Public	0.07	0.07	0.08	0.07	0.12	0.08
Private	0.13	0.14	0.08	0.13	0.09	0.11
Child received at least one medical visit						
Public	0.03	0.03	0.04	0.05	0.05	0.04
Private	0.13	0.00	0.25	0.02	0.06	0.07
Child received at least one breakfast						
Public	0.47	0.36	0.26	0.24	0.35	0.36
Private	0.13	0.00	0.08	0.13	0.00	0.05
Child received at least one school insurance visit						
Public	0.07	0.10	0.11	0.08	0.09	0.09
Private	0.00	0.00	0.00	0.00	0.00	0.00
Child rides a public bus to school						
Public	0.01	0.02	0.10	0.16	0.16	0.06
Private	0.38	0.43	0.17	0.07	0.09	0.12

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of children attending school that receive the benefit/service.

Table A3 - Coverage rates for primary school characteristics, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
Child's school has water connection						
Public	0.53	0.69	0.80	0.88	0.89	0.69
Private	1.00	0.93	0.97	0.97	0.98	0.97
Child's school has sewer connection						
Public	0.34	0.62	0.77	0.84	0.89	0.60
Private	1.00	0.90	0.90	0.97	0.99	0.96
Child's school has electricity connection						
Public	0.37	0.69	0.81	0.90	0.93	0.65
Private	1.00	0.97	0.90	0.99	1.00	0.98
Child's school has nurse's station						
Public	0.05	0.14	0.17	0.21	0.31	0.13
Private	0.43	0.31	0.38	0.47	0.60	0.51
Child's school has playground or gym						
Public	0.66	0.81	0.87	0.88	0.89	0.78
Private	0.86	0.72	0.78	0.75	0.84	0.80
Child received at least one dental visit						
Public	0.10	0.11	0.10	0.11	0.10	0.10
Private	0.00	0.07	0.07	0.01	0.07	0.05
Child received at least one medical visit						
Public	0.04	0.05	0.05	0.04	0.04	0.04
Private	0.00	0.00	0.12	0.01	0.05	0.05
Child received at least one breakfast						
Public	0.48	0.42	0.34	0.35	0.30	0.41
Private	0.14	0.14	0.05	0.05	0.03	0.05
Child received at least one school insurance visit						
Public	0.11	0.15	0.13	0.13	0.10	0.13
Private	0.00	0.00	0.00	0.00	0.00	0.00
Child rides a public bus to school						
Public	0.02	0.08	0.12	0.14	0.17	0.08
Private	0.57	0.34	0.19	0.22	0.15	0.19

Notes: see Table A2.

Table A4 - Coverage rates for secondary school characteristics, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
Child's school has water connection						
Public	0.73	0.82	0.88	0.92	0.95	0.86
Private	0.89	1.00	0.95	1.00	0.96	0.97
Child's school has sewer connection						
Public	0.59	0.78	0.86	0.91	0.94	0.81
Private	1.00	1.00	0.91	1.00	0.96	0.97
Child's school has electricity connection						
Public	0.69	0.83	0.92	0.97	0.97	0.87
Private	1.00	1.00	0.93	0.99	0.96	0.97
Child's school has nurse's station						
Public	0.13	0.26	0.35	0.35	0.44	0.30
Private	0.22	0.38	0.48	0.46	0.68	0.56
Child's school has playground or gym						
Public	0.79	0.88	0.92	0.93	0.94	0.89
Private	0.89	0.88	0.82	0.84	0.88	0.86
Child received at least one dental visit						
Public	0.06	0.05	0.03	0.03	0.05	0.04
Private	0.11	0.00	0.04	0.02	0.03	0.03
Child received at least one medical visit						
Public	0.04	0.04	0.03	0.04	0.07	0.04
Private	0.33	0.04	0.04	0.02	0.04	0.04
Child received at least one breakfast						
Public	0.05	0.02	0.02	0.03	0.02	0.03
Private	0.00	0.00	0.00	0.00	0.01	0.00
Child received at least one school insurance visit						
Public	0.11	0.11	0.09	0.08	0.07	0.09
Private	0.00	0.00	0.00	0.00	0.00	0.00
Child rides a public bus to school						
Public	0.10	0.15	0.22	0.23	0.25	0.19
Private	0.56	0.27	0.36	0.45	0.35	0.37

Notes: see Table A2.

Table A5 - Coverage rates for health consultations, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.79	0.72	0.68	0.66	0.65	0.70
Non-hospital consultation, MINSA	0.13	0.13	0.12	0.09	0.06	0.11
Non-hospital consultation, IPSS	0.00	0.01	0.02	0.04	0.04	0.02
Hospital consultation, MINSA	0.03	0.04	0.05	0.04	0.04	0.04
Hospital consultation, IPSS	0.00	0.01	0.04	0.06	0.06	0.03
Hospital consultation, Military	0.00	0.00	0.00	0.01	0.02	0.01
Private consultation	0.01	0.02	0.02	0.04	0.08	0.03
Pharmacy consultation	0.04	0.06	0.07	0.07	0.05	0.06

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of all survey respondents.

Table A6 - Coverage rates for health consultations free of charge, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.950	0.920	0.901	0.875	0.878	0.906
Non-hospital consultation, MINSA	0.037	0.041	0.028	0.020	0.012	0.028
Non-hospital consultation, IPSS	0.001	0.009	0.018	0.032	0.035	0.019
Hospital consultation, MINSA	0.007	0.013	0.010	0.008	0.007	0.009
Hospital consultation, IPSS	0.003	0.014	0.038	0.055	0.053	0.032
Hospital consultation, Military	0.001	0.000	0.004	0.008	0.013	0.005
Private consultation	0.000	0.000	0.000	0.000	0.001	0.001
Pharmacy consultation	0.000	0.002	0.000	0.001	0.001	0.001

Notes: see Table A5.

Table A7 - Coverage rates for hospitalizations, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.9901	0.9886	0.9842	0.9808	0.9814	0.9851
Non-hospital, MINSA	0.0029	0.0028	0.0025	0.0030	0.0019	0.0026
Non-hospital, IPSS	0.0001	0.0003	0.0003	0.0010	0.0012	0.0006
Hospital, MINSA	0.0060	0.0060	0.0074	0.0054	0.0042	0.0058
Hospital, IPSS	0.0006	0.0010	0.0049	0.0077	0.0069	0.0041
Hospital, Military	0.0000	0.0005	0.0003	0.0006	0.0016	0.0006
Private	0.0003	0.0008	0.0003	0.0014	0.0028	0.0011

Notes: see Table A5.

Table A8 - Coverage rates for hospitalizations free of charge, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.9966	0.9961	0.9929	0.9891	0.9905	0.9931
Non-hospital, MINSA	0.0013	0.0008	0.0003	0.0006	0.0005	0.0007
Non-hospital, IPSS	0.0001	0.0003	0.0003	0.0010	0.0012	0.0006
Hospital, MINSA	0.0014	0.0020	0.0015	0.0011	0.0005	0.0013
Hospital, IPSS	0.0006	0.0007	0.0046	0.0075	0.0066	0.0039
Hospital, Military	0.0000	0.0002	0.0003	0.0006	0.0008	0.0004
Private	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: see Table A5.

Table A9 - Coverage rates for breast cancer exams, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.901	0.895	0.881	0.870	0.886	0.886
MINSA, campaign	0.017	0.018	0.008	0.023	0.011	0.015
MINSA, not campaign	0.027	0.032	0.030	0.056	0.054	0.041
IPSS, campaign	0.005	0.005	0.005	0.002	0.005	0.005
IPSS, not campaign	0.030	0.029	0.038	0.030	0.025	0.030
Military	0.000	0.000	0.000	0.000	0.002	0.000
Private	0.002	0.008	0.008	0.005	0.014	0.008
Other	0.017	0.013	0.030	0.014	0.004	0.014

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of all women ages 12-49.

Table A10 - Coverage rates for pap smear, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.049	0.118	0.053	0.067	0.074	0.072
MINSA, campaign	0.186	0.118	0.179	0.125	0.169	0.155
MINSA, not campaign	0.569	0.598	0.526	0.617	0.603	0.586
IPSS, campaign	0.000	0.029	0.000	0.025	0.022	0.016
IPSS, not campaign	0.137	0.098	0.189	0.117	0.096	0.124
Military	0.010	0.000	0.000	0.000	0.000	0.002
Private	0.000	0.010	0.000	0.000	0.007	0.004
Other	0.049	0.029	0.053	0.050	0.029	0.041

Notes: see Table A9

Table A11 - Coverage rates for childhood vaccinations, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
None	0.049	0.118	0.053	0.067	0.074	0.072
MINSA, campaign	0.186	0.118	0.179	0.125	0.169	0.155
MINSA, not campaign	0.569	0.598	0.526	0.617	0.603	0.586
IPSS, campaign	0.000	0.029	0.000	0.025	0.022	0.016
IPSS, not campaign	0.137	0.098	0.189	0.117	0.096	0.124
Military	0.010	0.000	0.000	0.000	0.000	0.002
Private	0.000	0.010	0.000	0.000	0.007	0.004
Other	0.049	0.029	0.053	0.050	0.029	0.041

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of last born children to women ages 12-49 receiving at least one of four vaccinations (BCG, polio, DPT, and Measles).

Table A12 - Coverage rates for households benefiting from social programs, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
Vaso de leche	0.622	0.529	0.447	0.303	0.174	0.440
Comedor popular	0.070	0.078	0.066	0.047	0.030	0.056
Other food programs	0.203	0.128	0.072	0.032	0.033	0.107
School breakfast	0.460	0.382	0.318	0.272	0.193	0.340
School uniforms	0.169	0.152	0.124	0.081	0.053	0.123
School books	0.136	0.116	0.076	0.057	0.051	0.092
School insurance	0.162	0.226	0.198	0.150	0.102	0.171
Child well visit	0.418	0.406	0.395	0.391	0.372	0.400
Family planning	0.187	0.199	0.182	0.141	0.092	0.155
Tuberculosis exam	0.038	0.035	0.027	0.023	0.009	0.025
Childhood vaccinations	0.436	0.460	0.469	0.535	0.480	0.471

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of households with at least one member receiving this benefit/service.

Table A13 - Coverage rates of public utilities, by quintile, ENAHO 1998-II

	Quintile					
	1	2	3	4	5	All
Home has water connection	0.31	0.41	0.55	0.68	0.78	0.56
Home has sewer connection	0.10	0.25	0.41	0.56	0.72	0.43
Home has electricity connection	0.02	0.03	0.11	0.23	0.50	0.20
Home has fixed line telephone	0.12	0.31	0.48	0.60	0.73	0.47
Home uses electricity	0.29	0.57	0.76	0.87	0.92	0.71

Notes: Quintiles are by weighted per capita income.
Coverage rate is share of households with the service.

Table A14 – Dominance tests for public school attendance, ENAHO 1998-II

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Literacy campaign participant, 2 years					D	D	D
(2)	Public primary student					D	D	D
(3)	Public pre-primary student					D	D	D
(4)	Public secondary student					X	D	D
(5)	45 degree line				X			D
(6)	Public post-secondary student							
(7)	Household total current income, annual							

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Literacy campaign participant, 2 years		D	D	D	D	D	D
(2)	Public primary student				D	D	D	D
(3)	Public pre-primary student				D	D	D	D
(4)	Public secondary student						D	D
(5)	45 degree line						D	D
(6)	Public post-secondary student							D
(7)	Household total current income, annual							

Notes: Top panel gives the dominance test for the concentration curves. Bottom panel gives the results for S-gini comparisons. A "D" indicates that the row dominates the column; an "X" a statistically significant crossing, and a blank accepts the null of non-dominance.

Table A15 – Dominance tests for quality characteristics of pre-primary schools, ENAHO 1998-II

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Public pre-primary student			D	D	D	D		D
(2)	Pre-primary school has playground								D
(3)	Pre-primary school has water								D
(4)	Pre-primary school has electricity					X			D
(5)	45 degree line				X		X	X	D
(6)	Pre-primary school has sewer					X			D
(7)	Pre-primary school has nurse station					X			
(8)	Household total current income, annual								

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Public pre-primary student		D	D	D	D	D	D	D
(2)	Pre-primary school has playground			D	D	D	D	D	D
(3)	Pre-primary school has water				D		D	D	D
(4)	Pre-primary school has electricity						D		D
(5)	45 degree line						X		D
(6)	Pre-primary school has sewer					X			D
(7)	Pre-primary school has nurse station								D
(8)	Household total current income, annual								

Notes: See note to Table A14.

Table A16 – Dominance tests for quality characteristics of primary schools, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Public primary student			D	D	D	D	D	D
(2) Primary school has playground				D	D	D	D	D
(3) Primary school has water							D	D
(4) Primary school has electricity						X	D	D
(5) Primary school has sewer						X	D	D
(6) 45 degree line				X	X		X	D
(7) Primary school has nurse station						X		D
(8) Household total current income, annual								

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Public primary student		D	D	D	D	D	D	D
(2) Primary school has playground			D	D	D	D	D	D
(3) Primary school has water				D	D	D	D	D
(4) Primary school has electricity						D	D	D
(5) Primary school has sewer						D	D	D
(6) 45 degree line								D
(7) Primary school has nurse station								D
(8) Household total current income, annual								

Notes: See note to Table A14.

Table A17 – Dominance tests for quality characteristics of secondary schools, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Public secondary student				D	X	D		D
(2) Secondary school has playground					X			D
(3) Secondary school has water				X	X			D
(4) Secondary school has electricity			X		X			D
(5) 45 degree line	X	X	X		X	X	D	
(6) Secondary school has sewer					X			D
(7) Secondary school has nurse station					X			
(8) Household total current income, annual								

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Public secondary student		D	D	D		D	D	D
(2) Secondary school has playground			D	D	X	D	D	D
(3) Secondary school has water					X	D	D	D
(4) Secondary school has electricity					X	D	D	D
(5) 45 degree line		X	X	X		X		D
(6) Secondary school has sewer					X		D	D
(7) Secondary school has nurse station								D
(8) Household total current income, annual								

Notes: See note to Table A14.

Table A18 – Dominance tests for supplementary services at schools, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) At least one school breakfast			D				D	D	D	D	D	D
(2) Benefited from school uniforms										D	D	D
(3) Public primary student										D	D	D
(4) Benefited from school breakfast										D	D	D
(5) Benefited from school books										D	D	D
(6) Benefited from school insurance							X				D	D
(7) At least one school dental visit						X			X	D	D	D
(8) At least one school health visit									X			D
(9) Public secondary student							X	X		X	D	D
(10) 45 degree line									X		D	D
(11) Uses public transport for school												D
(12) Household total current income, annual												

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) At least one school breakfast			D	D	D	D	D	D	D	D	D	D
(2) Benefited from school uniforms						D	D	D	D	D	D	D
(3) Public primary student						D	D	D	D	D	D	D
(4) Benefited from school breakfast						D	D	D	D	D	D	D
(5) Benefited from school books							D	D	D	D	D	D
(6) Benefited from school insurance									D	D	D	D
(7) At least one school dental visit								D		D	D	D
(8) At least one school health visit										D	D	D
(9) Public secondary student											D	D
(10) 45 degree line											D	D
(11) Uses public transport for school												D
(12) Household total current income, annual												

Notes: See note to Table A14.

Table A19 – Dominance tests for use of public health services, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Free Non-Hospital Consultation, MINSA					D			D
(2) Non-Hospital Hospitalization, MINSA								D
(3) Non-Hospital Consultation, MINSA							D	D
(4) Hospital Hospitalization, MINSA								D
(5) Free Hospital Consultation, MINSA								
(6) 45 degree line								D
(7) Hospital Consultation, MINSA								D
(8) Household total current income, annual								

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Free Non-Hospital Consultation, MINSA			D	D	D	D	D	D
(2) Non-Hospital Hospitalization, MINSA							D	D
(3) Non-Hospital Consultation, MINSA					D	D	D	D
(4) Hospital Hospitalization, MINSA							D	D
(5) Free Hospital Consultation, MINSA								D
(6) 45 degree line								D
(7) Hospital Consultation, MINSA								D
(8) Household total current income, annual								

Notes: See note to Table A14.

Table A20 – Dominance tests for women's preventative health care, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Free Non-Hospital Consultation, MINSA						D	D	D
(2) Non-Hospital Consultation, MINSA				X		D	D	D
(3) PAP smear, campaign, MINSA					X			D
(4) Breast cancer exam, campaign, MINSA		X			X			
(5) 45 degree line			X	X		X		D
(6) PAP smear, not campaign, MINSA					X			D
(7) Breast cancer exam, not campaign, MINSA								D
(8) Household total current income, annual								

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Free Non-Hospital Consultation, MINSA		D	D	D	D	D	D	D
(2) Non-Hospital Consultation, MINSA				D	D	D	D	D
(3) PAP smear, campaign, MINSA						D	D	D
(4) Breast cancer exam, campaign, MINSA						D	D	D
(5) 45 degree line							D	D
(6) PAP smear, not campaign, MINSA								D
(7) Breast cancer exam, not campaign, MINSA								D
(8) Household total current income, annual								

Notes: See note to Table A14.

Table A21 – Dominance tests for child well visits and preventative health care, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Free Non-Hospital Consultation, MINSA				X					D
(2) Vaccination, campaign, MINSA								D	D
(3) Number of child health visits, MINSA					D		D	D	D
(4) Benefited from child wellness visit	X						D	D	
(5) Vaccination, not campaign, MINSA									D
(6) Non-Hospital Consultation, MINSA									D
(7) Benefited from vaccinations								D	D
(8) 45 degree line									D
(9) Household total current income, annual									

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Free Non-Hospital Consultation, MINSA					D	D	D	D	D
(2) Vaccination, campaign, MINSA					D	D	D	D	D
(3) Number of child health visits, MINSA				D	D	D	D	D	D
(4) Benefited from child wellness visit							D	D	D
(5) Vaccination, not campaign, MINSA							D	D	D
(6) Non-Hospital Consultation, MINSA								D	D
(7) Benefited from vaccinations								D	D
(8) 45 degree line									D
(9) Household total current income, annual									

Notes: See note to Table A14.

Table A22 – Dominance tests for miscellaneous social services, ENAHO 1998-II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Benefited from other food												D	D
(2) Benefited from school uniforms												D	D
(3) Benefited from Vaso de leche				X					D	D		D	D
(4) Benefited from school breakfast			X						D	D		D	D
(5) Benefited from school books												D	D
(6) Benefited from school insurance								X		X			D
(7) Benefited from tuberculosis check								X					D
(8) Benefited from child wellness visit						X	X					D	D
(9) Benefited from family planning										X			D
(10) Benefited from vaccinations						X			X			D	D
(11) Benefited from comedor popular													D
(12) 45 degree line													D
(13) Household total current income, annual													

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Benefited from other food		D	D	D	D	D	D	D	D	D	D	D	D
(2) Benefited from school uniforms						D	D	D	D	D	D	D	D
(3) Benefited from Vaso de leche						D	D	D	D	D	D	D	D
(4) Benefited from school breakfast						D	D	D	D	D	D	D	D
(5) Benefited from school books								D	D	D	D	D	D
(6) Benefited from school insurance									D		D	D	D
(7) Benefited from tuberculosis check												D	D
(8) Benefited from child wellness visit										D		D	D
(9) Benefited from family planning												D	D
(10) Benefited from vaccinations												D	D
(11) Benefited from comedor popular													D
(12) 45 degree line													D
(13) Household total current income, annual													

Notes: See note to Table A14.

Table A23 – Coverage rates for public utilities, ENNIV, all years

	Clusters in 1991 sampling domains						Clusters in all domains sampled					
Home has connection to public water network												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.272	0.390	0.573	0.704	0.868	0.602	0.250	0.380	0.539	0.672	0.839	0.563
1991	0.553	0.760	0.800	0.862	0.899	0.795						
1994	0.555	0.681	0.771	0.862	0.913	0.794	0.383	0.555	0.674	0.796	0.868	0.670
1997	0.778	0.768	0.829	0.853	0.947	0.857	0.538	0.619	0.722	0.805	0.881	0.724
Home has connection to public sewer												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.085	0.204	0.397	0.540	0.783	0.449	0.070	0.188	0.364	0.514	0.748	0.408
1991	0.293	0.518	0.634	0.676	0.786	0.611						
1994	0.099	0.356	0.490	0.675	0.815	0.561	0.077	0.254	0.409	0.593	0.757	0.440
1997	0.395	0.499	0.667	0.719	0.883	0.691	0.225	0.352	0.535	0.673	0.816	0.539
Home has telephone												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.002	0.019	0.035	0.078	0.275	0.100	0.002	0.014	0.033	0.077	0.256	0.089
1991	0.006	0.043	0.108	0.166	0.301	0.145						
1994	0.000	0.011	0.045	0.128	0.402	0.160	0.000	0.009	0.038	0.119	0.360	0.119
1997	0.080	0.123	0.212	0.275	0.496	0.288	0.006	0.025	0.111	0.265	0.564	0.215
Home has electricity connection												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.171	0.333	0.577	0.676	0.873	0.573	0.162	0.319	0.537	0.650	0.844	0.533
1991	0.517	0.742	0.834	0.856	0.900	0.792						
1994	0.357	0.632	0.804	0.880	0.935	0.780	0.252	0.543	0.729	0.818	0.898	0.665
1997	0.602	0.701	0.811	0.863	0.936	0.822	0.419	0.564	0.724	0.810	0.912	0.701

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of households with a connection.

Table A24 – Coverage rates for school attendance, ENNIV, all years

	Clusters in 1991 sampling domains						Clusters in all domains sampled					
Children *not* attending pre-primary school												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.546	0.548	0.512	0.380	0.244	0.461	0.555	0.536	0.515	0.394	0.264	0.474
1991	0.544	0.456	0.484	0.392	0.372	0.461						
1994	0.493	0.421	0.458	0.350	0.200	0.402	0.548	0.461	0.469	0.322	0.217	0.445
1997	0.343	0.361	0.273	0.322	0.332	0.324	0.379	0.360	0.313	0.235	0.211	0.326
Children *not* attending primary school												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.150	0.095	0.044	0.031	0.005	0.069	0.137	0.088	0.047	0.033	0.007	0.069
1991	0.041	0.025	0.015	0.021	0.003	0.024						
1994	0.060	0.016	0.018	0.006	0.021	0.027	0.056	0.018	0.017	0.018	0.021	0.031
1997	0.027	0.011	0.029	0.011	0.020	0.019	0.037	0.015	0.011	0.011	0.000	0.020
Children *not* attending secondary school												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.399	0.258	0.229	0.169	0.133	0.263	0.386	0.260	0.229	0.166	0.150	0.268
1991	0.254	0.154	0.244	0.127	0.214	0.202						
1994	0.255	0.372	0.313	0.282	0.359	0.311	0.279	0.304	0.312	0.275	0.416	0.302
1997	0.158	0.133	0.115	0.086	0.061	0.102	0.213	0.133	0.098	0.065	0.037	0.121
Children *not* attending post-secondary school												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.833	0.653	0.510	0.398	0.169	0.441	0.819	0.651	0.540	0.427	0.186	0.476
1991	0.616	0.626	0.527	0.416	0.313	0.488						
1994	0.698	0.633	0.563	0.455	0.300	0.490	0.707	0.638	0.586	0.465	0.317	0.527
1997	0.553	0.606	0.567	0.501	0.322	0.473	0.787	0.696	0.584	0.461	0.211	0.532

Notes: Quintiles are by weighted per capita income.
Coverage rates are share of eligible children, where "eligible" is defined as (1) attending school at this level, or (2) being of the correct age for this level and not attending another level.

Table A25 – Coverage rates for health consultations and *vaso de leche* program, ENNIV, all years

	Clusters in 1991 sampling domains						Clusters in all domains sampled					
People *not* receiving at least one health consultation in the past month												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.921	0.872	0.824	0.779	0.743	0.823	0.922	0.872	0.825	0.784	0.748	0.830
1991	0.911	0.857	0.817	0.816	0.756	0.830						
1994	0.933	0.906	0.861	0.829	0.806	0.861	0.927	0.898	0.860	0.826	0.796	0.865
1997	0.845	0.799	0.772	0.784	0.781	0.790	0.790	0.754	0.747	0.736	0.758	0.756
People *not* receiving at least one free health consultation in the past month												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1985	0.962	0.947	0.929	0.914	0.891	0.927	0.962	0.948	0.928	0.915	0.895	0.930
1991	0.968	0.937	0.912	0.925	0.901	0.928						
1994	0.975	0.959	0.945	0.920	0.908	0.938	0.970	0.953	0.942	0.917	0.909	0.940
1997	0.925	0.917	0.899	0.901	0.882	0.900	0.908	0.894	0.877	0.862	0.879	0.883
Children receiving *vaso de leche*												
	Quintile						Quintile					
	1	2	3	4	5	Total	1	2	3	4	5	Total
1991	0.235	0.240	0.212	0.179	0.067	0.200						
1994	0.529	0.545	0.543	0.325	0.117	0.439	0.651	0.604	0.552	0.330	0.142	0.519
1997	0.810	0.825	0.639	0.594	0.444	0.640	0.650	0.762	0.609	0.526	0.232	0.611

Notes: Quintiles are by weighted per capita income.
Coverage rates for health consultations are share of all survey respondents. Coverage rates for *vaso de leche* program are share of children of (pre-)primary school age receiving a glass of milk or its equivalent.

Table A26 – Dominance tests for public utilities connections, ENNIV, all years

Public water connection

	1997	1991	1994	1985
1997				
1991				
1994				D
1985				

	1997	1991	1994	1985
1997				D
1991				D
1994				D
1985				

Telephone connection

	1991	1997	1985	1994
1991				
1997				
1985				
1994				

	1991	1997	1985	1994
1991			D	D
1997				D
1985				
1994				

Public electricity connection

	1997	1991	1994	1985
1997				D
1991				D
1994				
1985				

	1997	1991	1994	1985
1997				D
1991				D
1994				D
1985				

Public sewer connection

	1997	1994	1991	1985
1997				D
1991				D
1994				
1985				

	1997	1994	1991	1985
1997			D	D
1991			D	D
1994				D
1985				

Notes: Top panel gives the dominance test for the concentration curves. Bottom panel gives the results for S-gini comparisons. A “D” indicates that the row dominates the column; an “X” a statistically significant crossing, and a blank accepts the null of non-dominance.
All tests are for households found in the 1991 sampling domain only.

Table A27 – Dominance tests for attendance at public schools, ENNIV, all years

Public primary school

	1997	1994	1991	1985
1997				D
1994				D
1991				
1985				

1997			D	D
1994				D
1991				D
1985				

Public secondary school

	1991	1997	1994	1985
1991		X		D
1997	X			D
1994				D
1985				

1991				D
1997				D
1994				D
1985				

Public post-secondary school

	1991	1994	1997	1985
1991				D
1994				D
1997				
1985				

1991			D	D
1994				D
1997				D
1985				

Notes: See notes for Table A26

Table A28 – Dominance tests for health consultations and *vaso de leche*, ENNIV, all years

Health center or health post consultation

	1997	1994	1985	1991
1997				
1994				
1985				
1991				

1997			D	D
1994				
1985				
1991				

Hospital consultation

	1991	1997	1994	1985
1991				
1997				
1994				
1985				

1991				D
1997				D
1994				
1985				

Vaso de leche

	1994	1997	1991
1994		X	
1997	X		
1991			

1994			
1997			
1991			

Notes: See notes for Table 27

Appendix 4

Auxiliary Graphs

Figure A1 - Concentration curves for attendance at a public school, Peru, ENAHO 1998-II

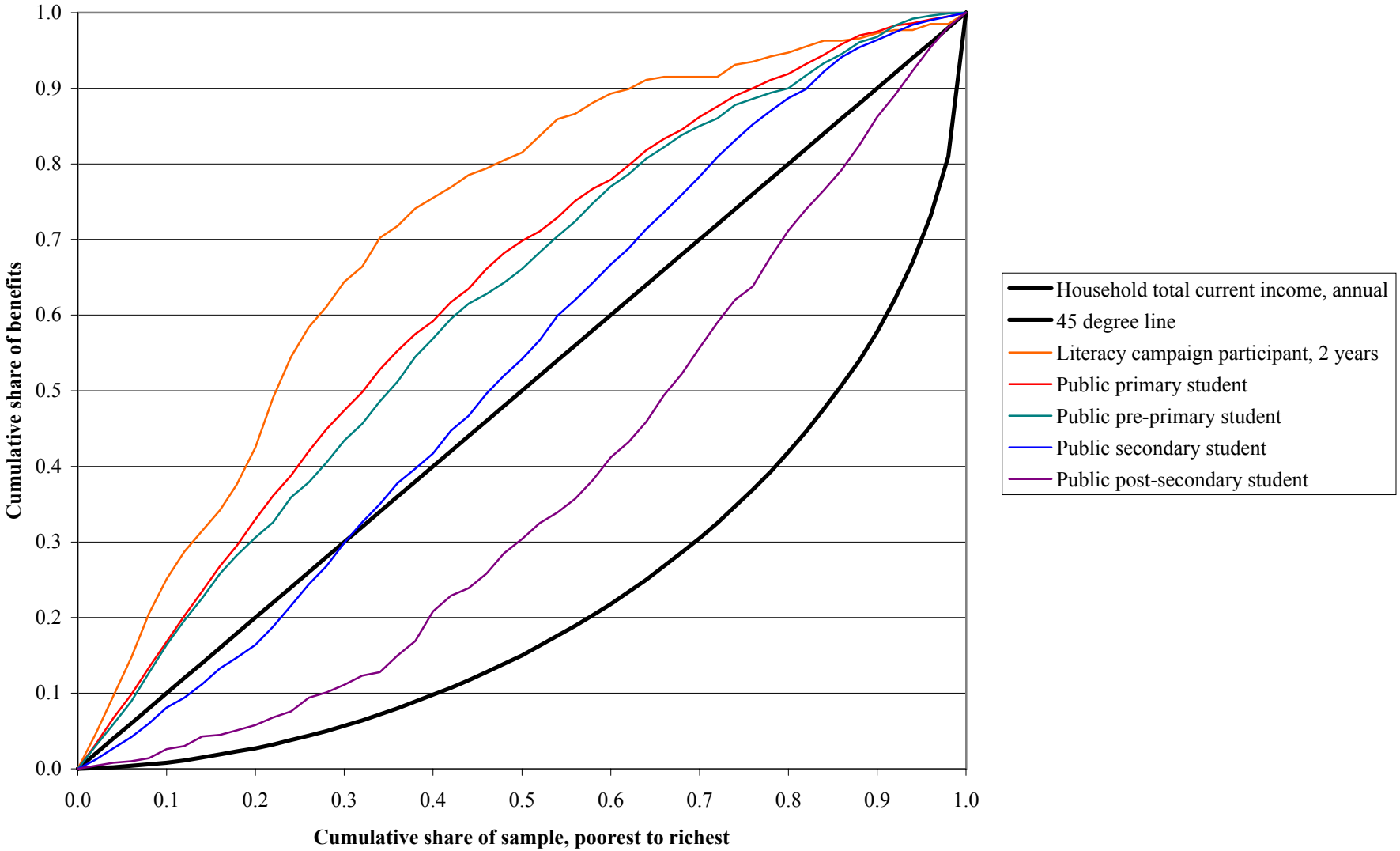

Figure A2 - Concentration curves for supplementary services at school, Peru, ENAHO 1998-II

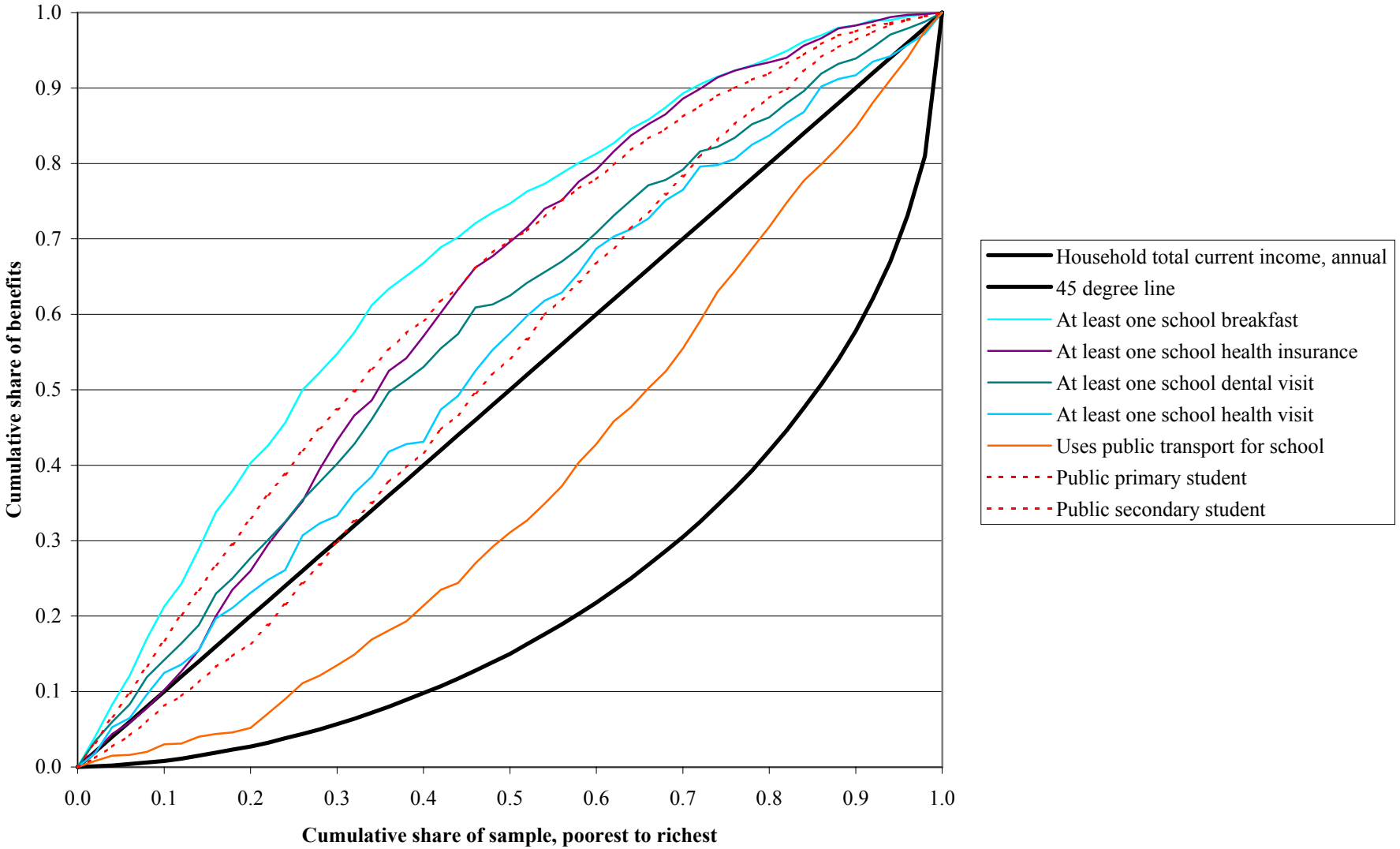

Figure A3 - Concentration curves for consultations at a public non-hospital facility, ENAHO 1998-II

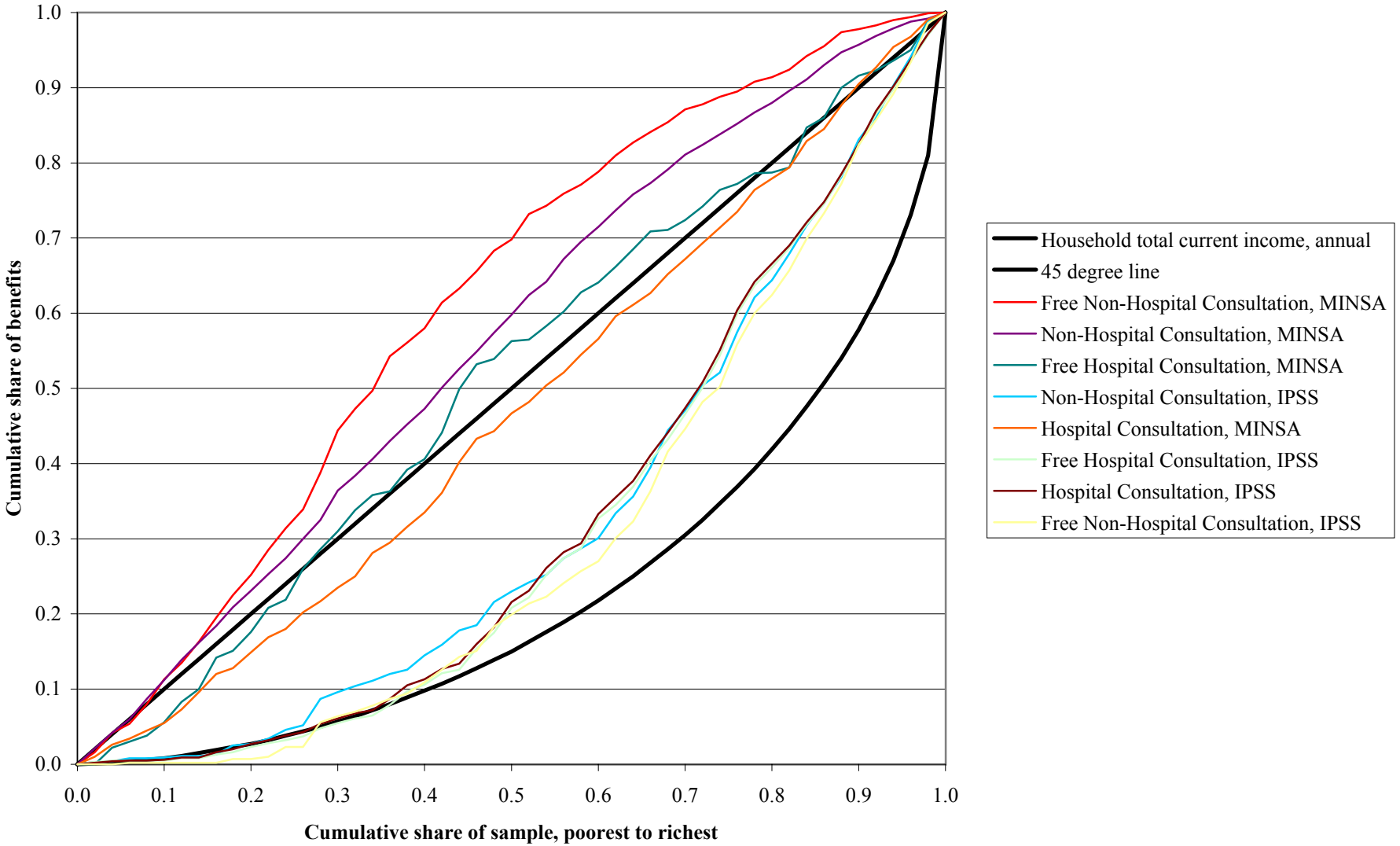

Figure A4 - Concentration curves for hospitalizations at a pubic hospital, ENAHO 1998-II

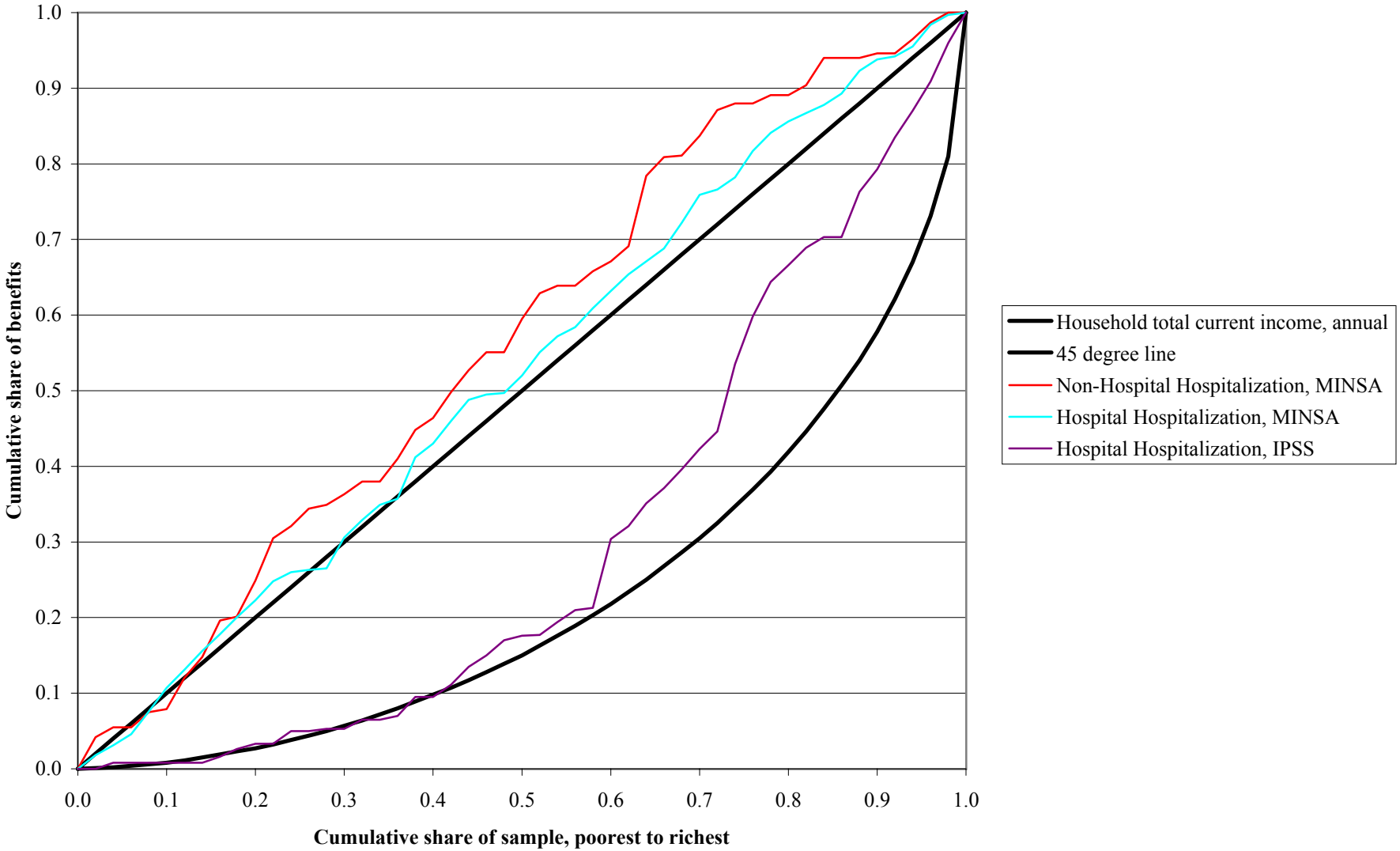

Figure A5 - Concentration curves for women's preventative health care, ENAHO 1998-II

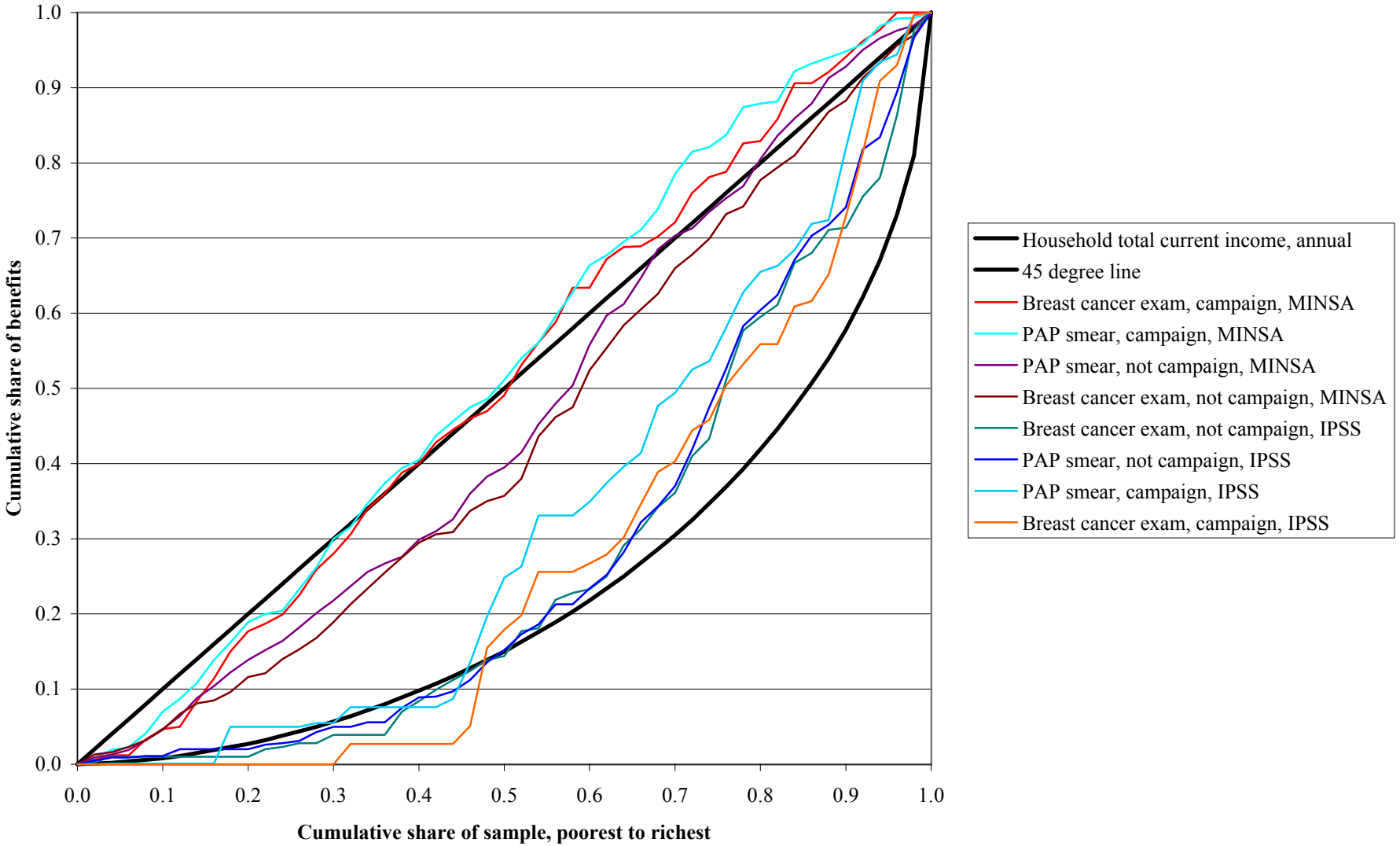

Figure A6 - Concentration curves for children's preventative health care, ENAHO 1998-II

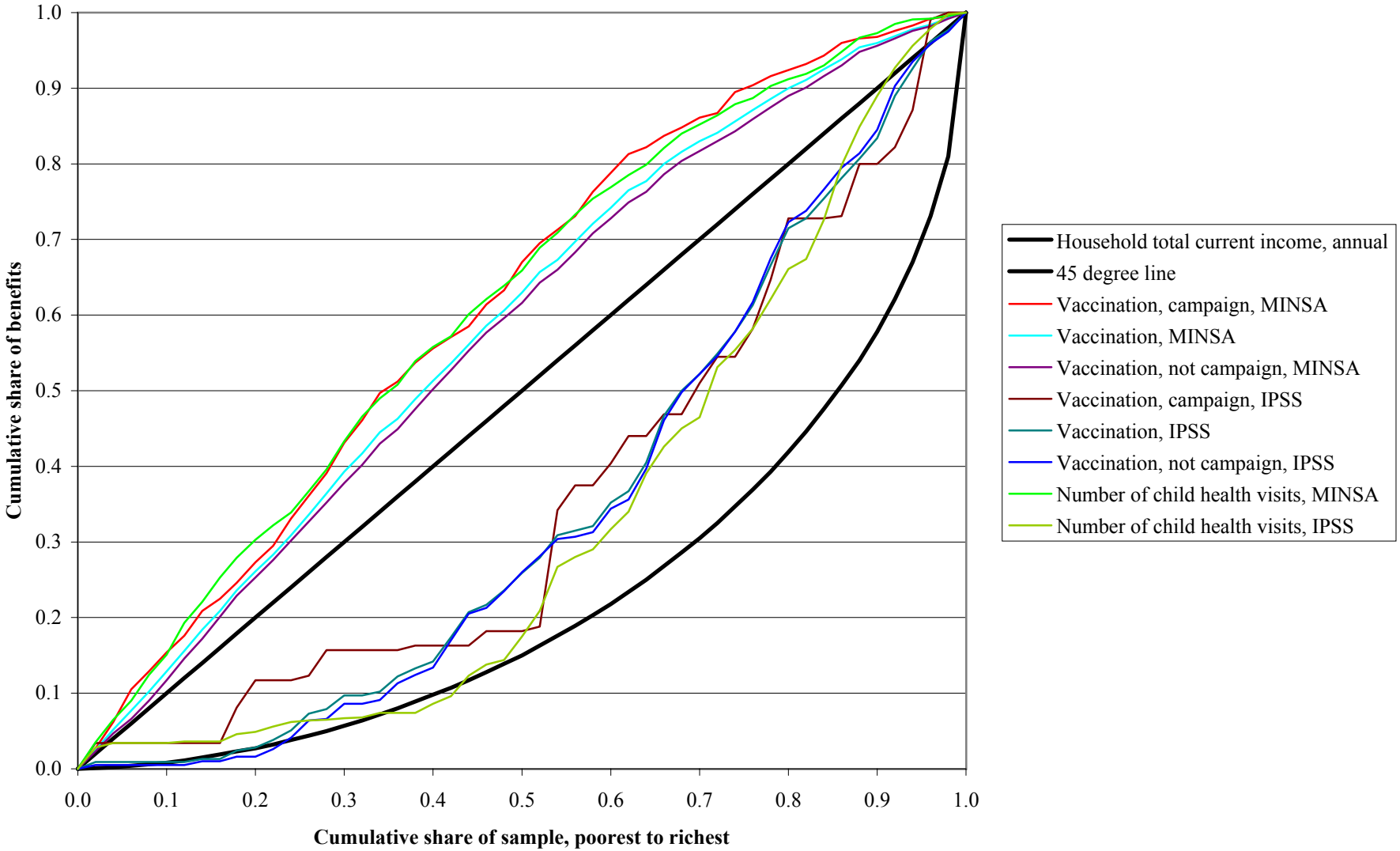

Figure A7 - Concentration curves for miscellaneous social services, ENAHO 1998-II

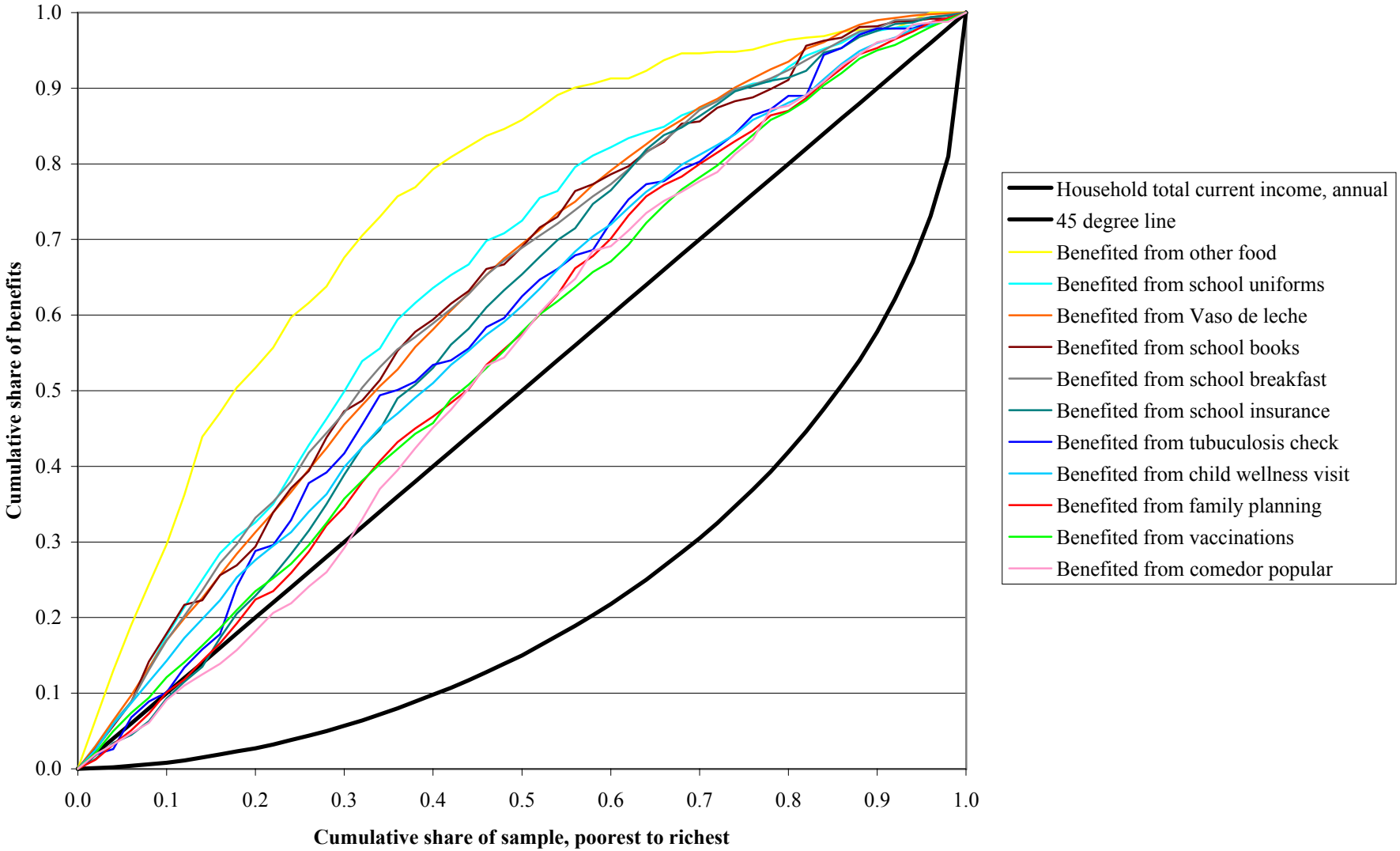

Figure A8 - Concentration curves for public primary school, ENNIV surveys, 1991 domains

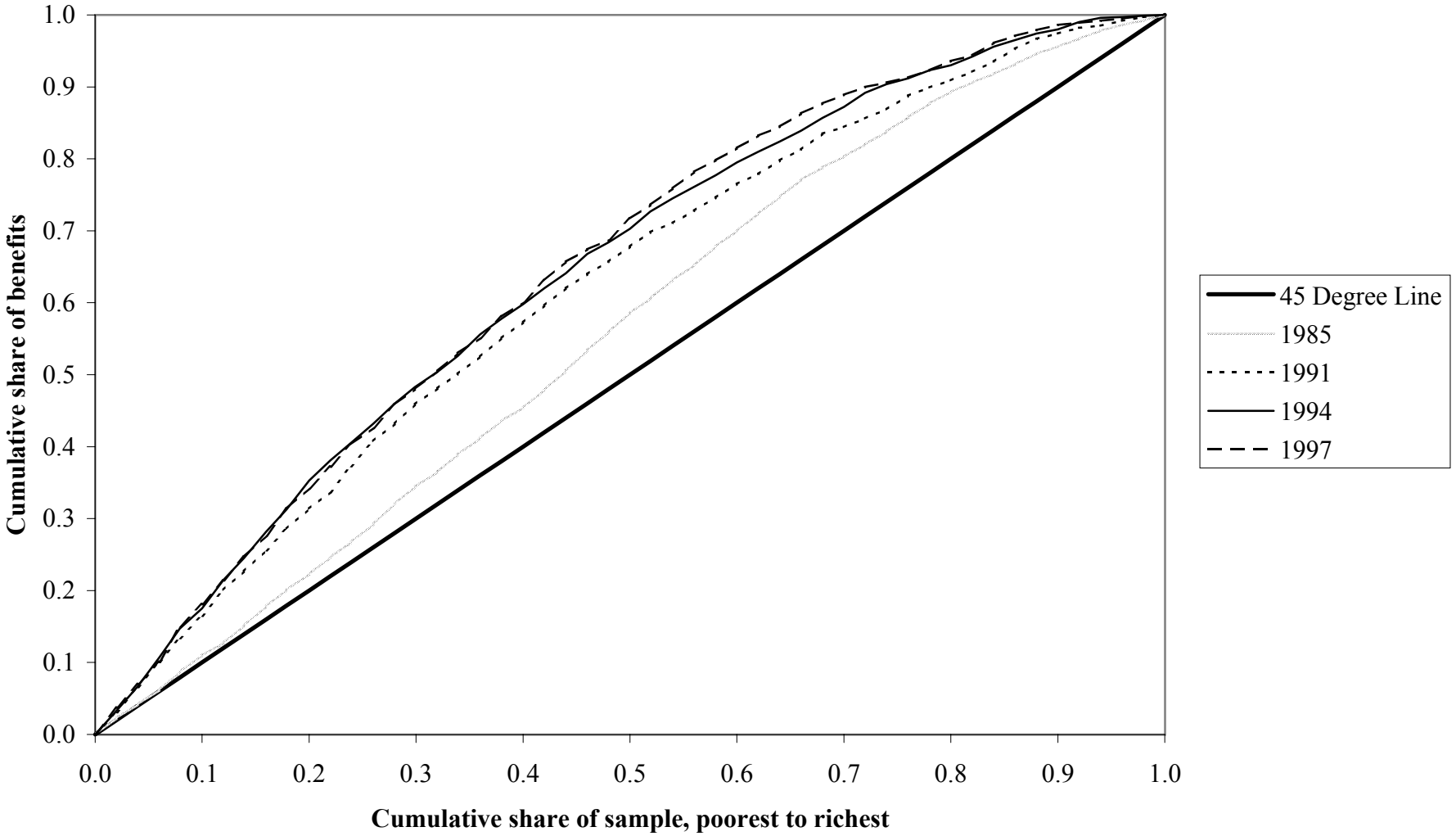

Figure A9 - Concentration curves for public secondary school, ENNIV surveys, 1991 domains

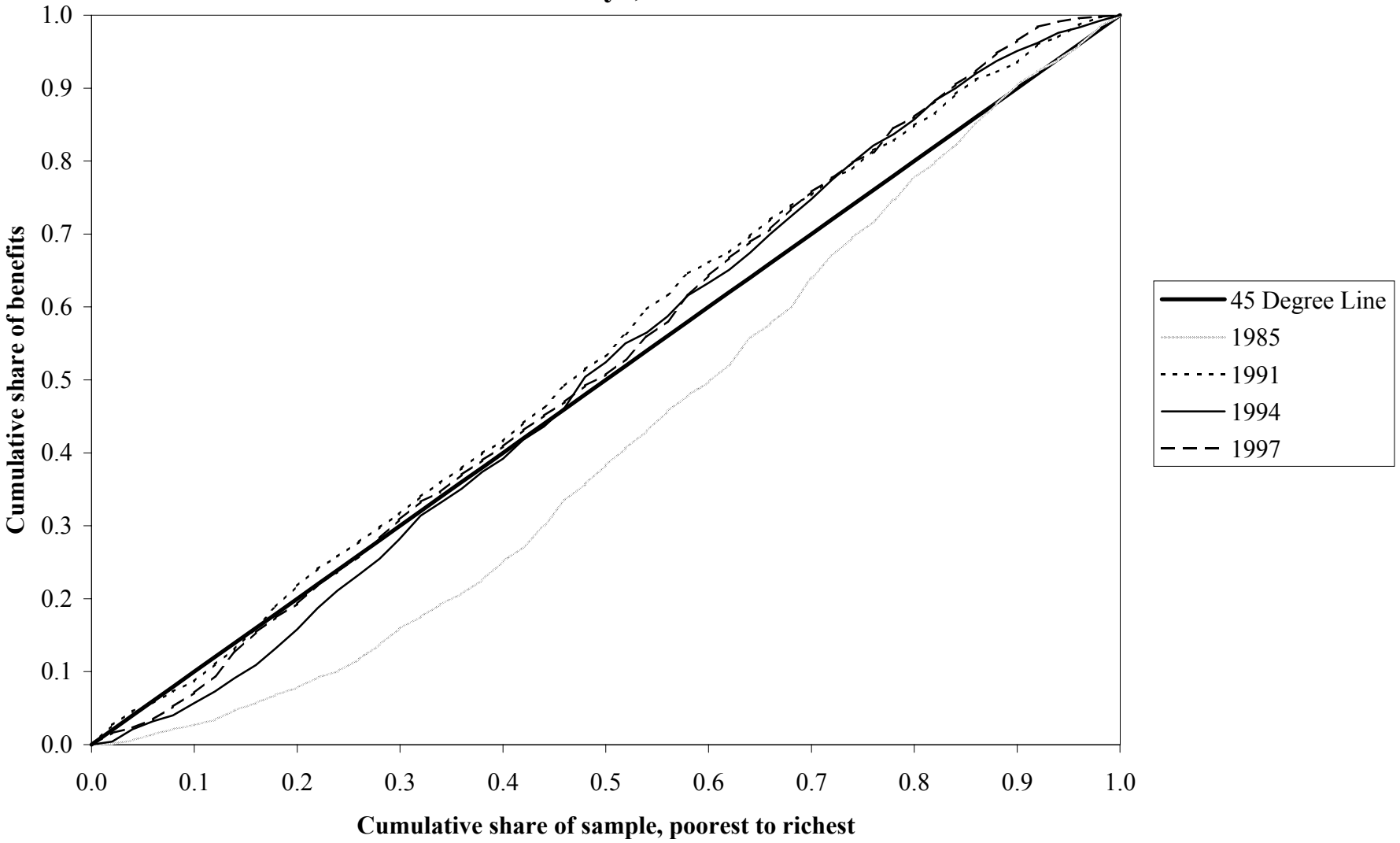

Figure A10 - Concentration curves for public university, ENNIV surveys, 1991 domains

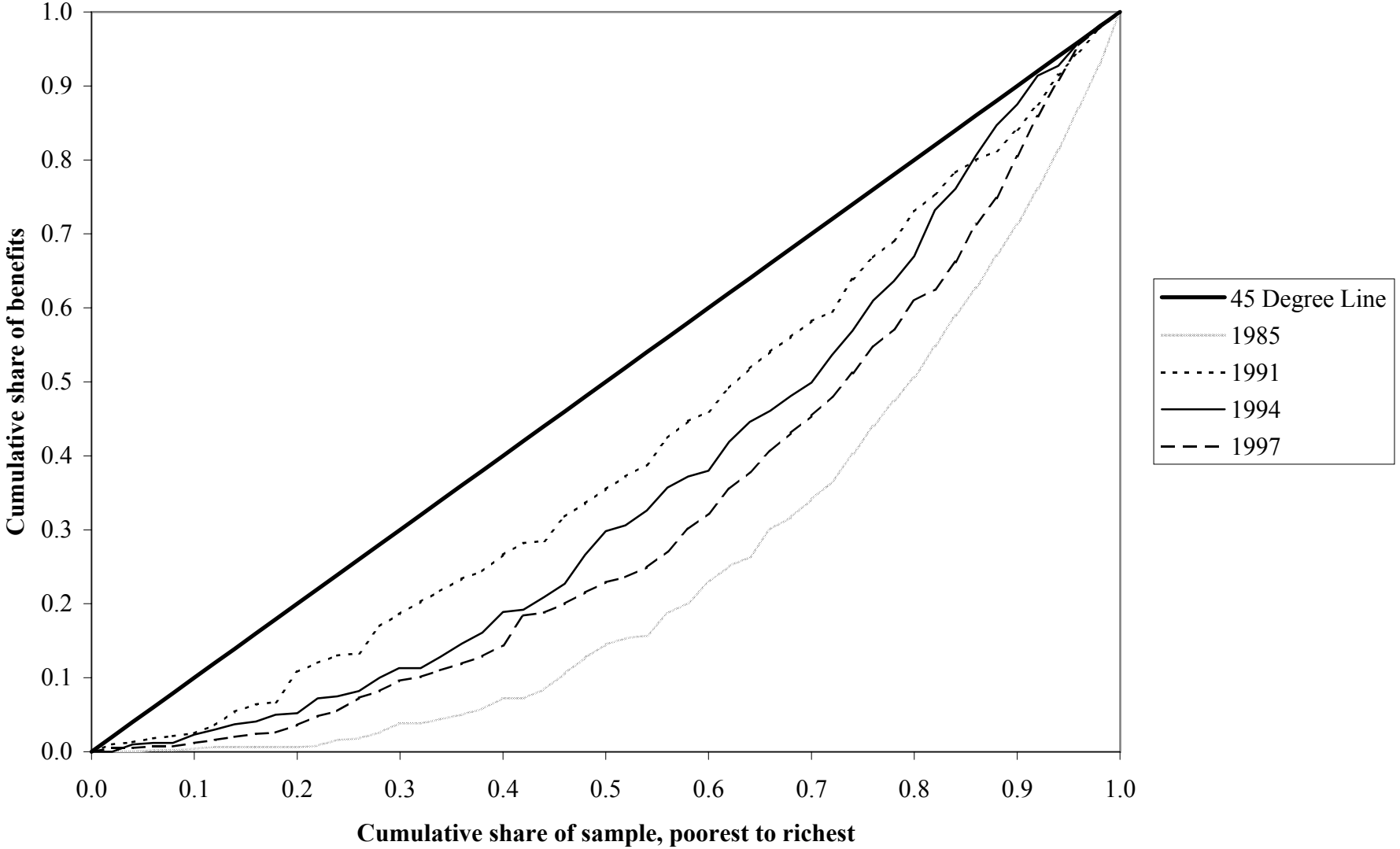

Figure A11 - Concentration curves for piped water service, ENNIV surveys, 1991 domains

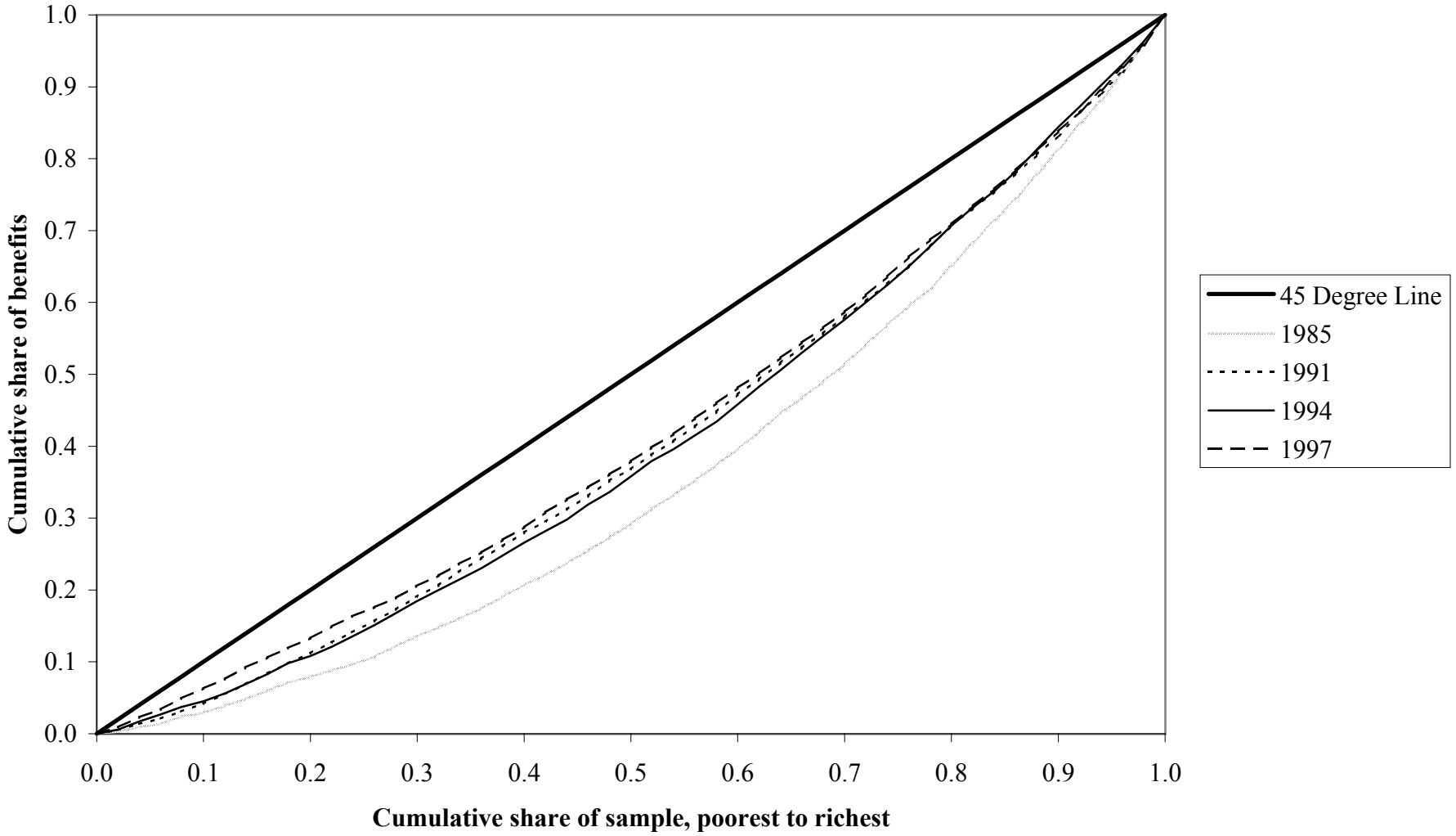

Figure A12 - Concentration curves for electricity connection, ENNIV surveys, 1991 domains

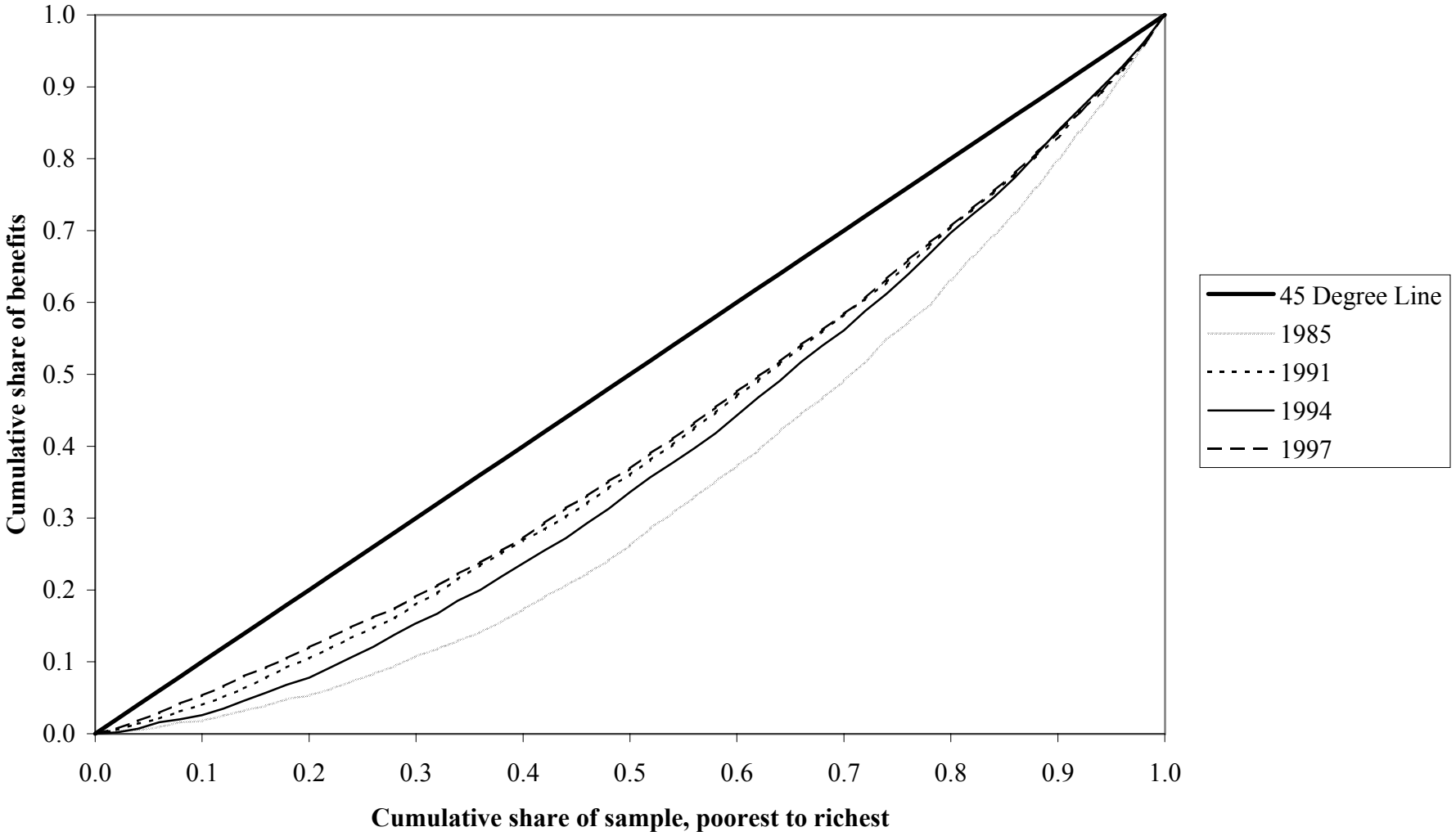

Figure A13 - Concentration curves for sewer connection, ENNIV surveys, 1991 domains

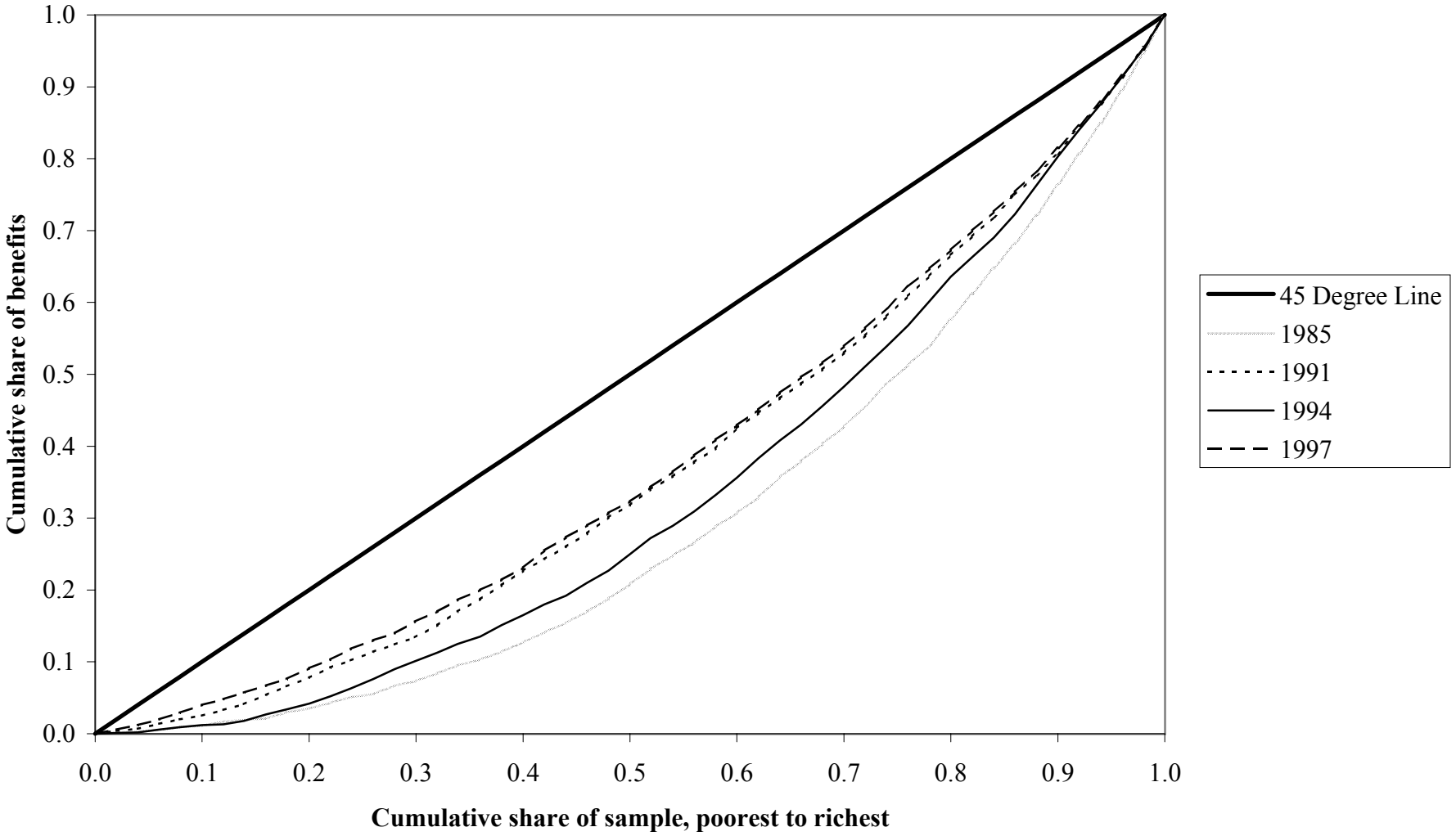

Figure A14 - Concentration curves for telephone connection, ENNIV surveys, 1991 domains

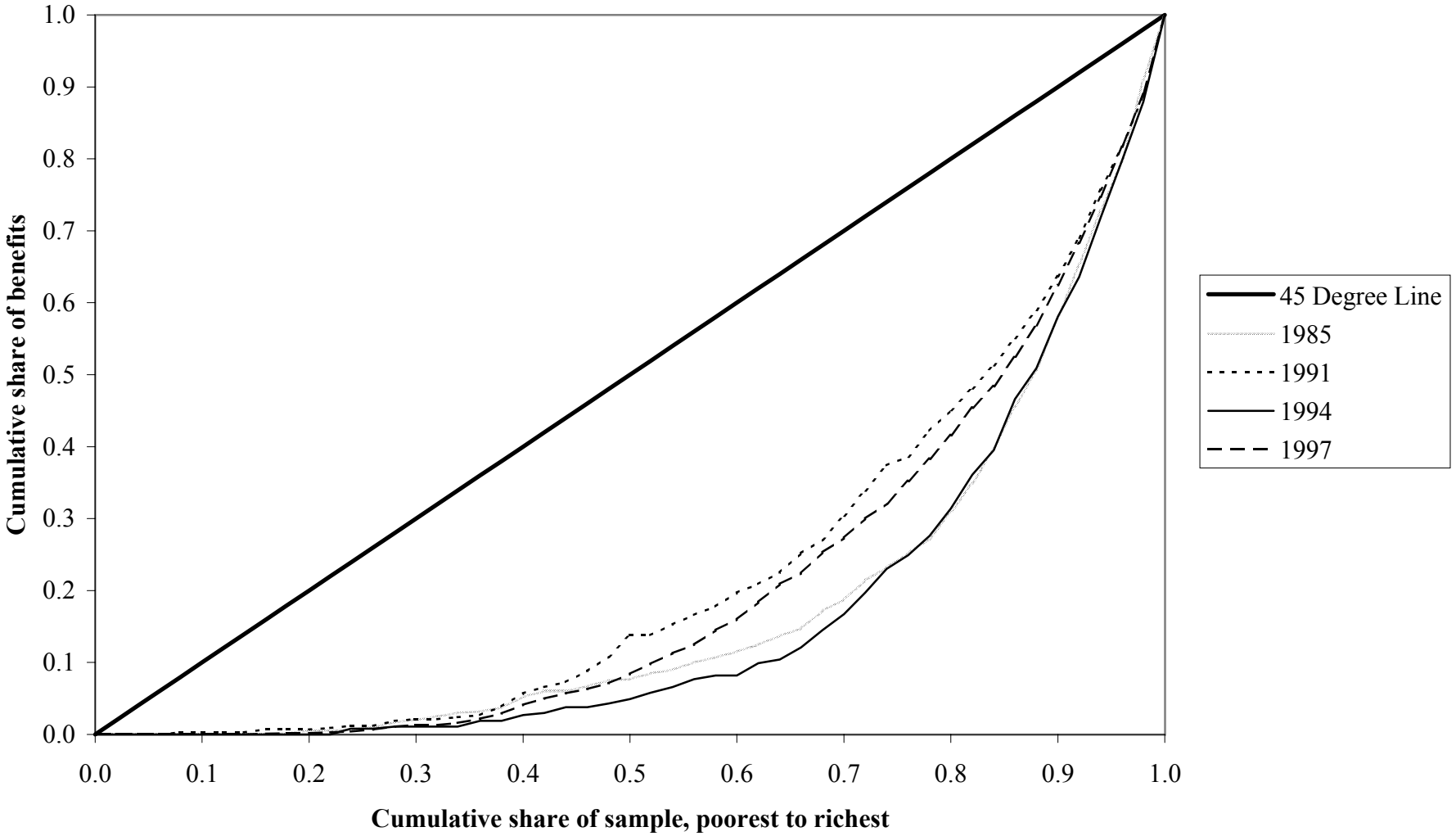

Figure A15 - Concentration curves for hospital care, ENNIV surveys, 1991 domains

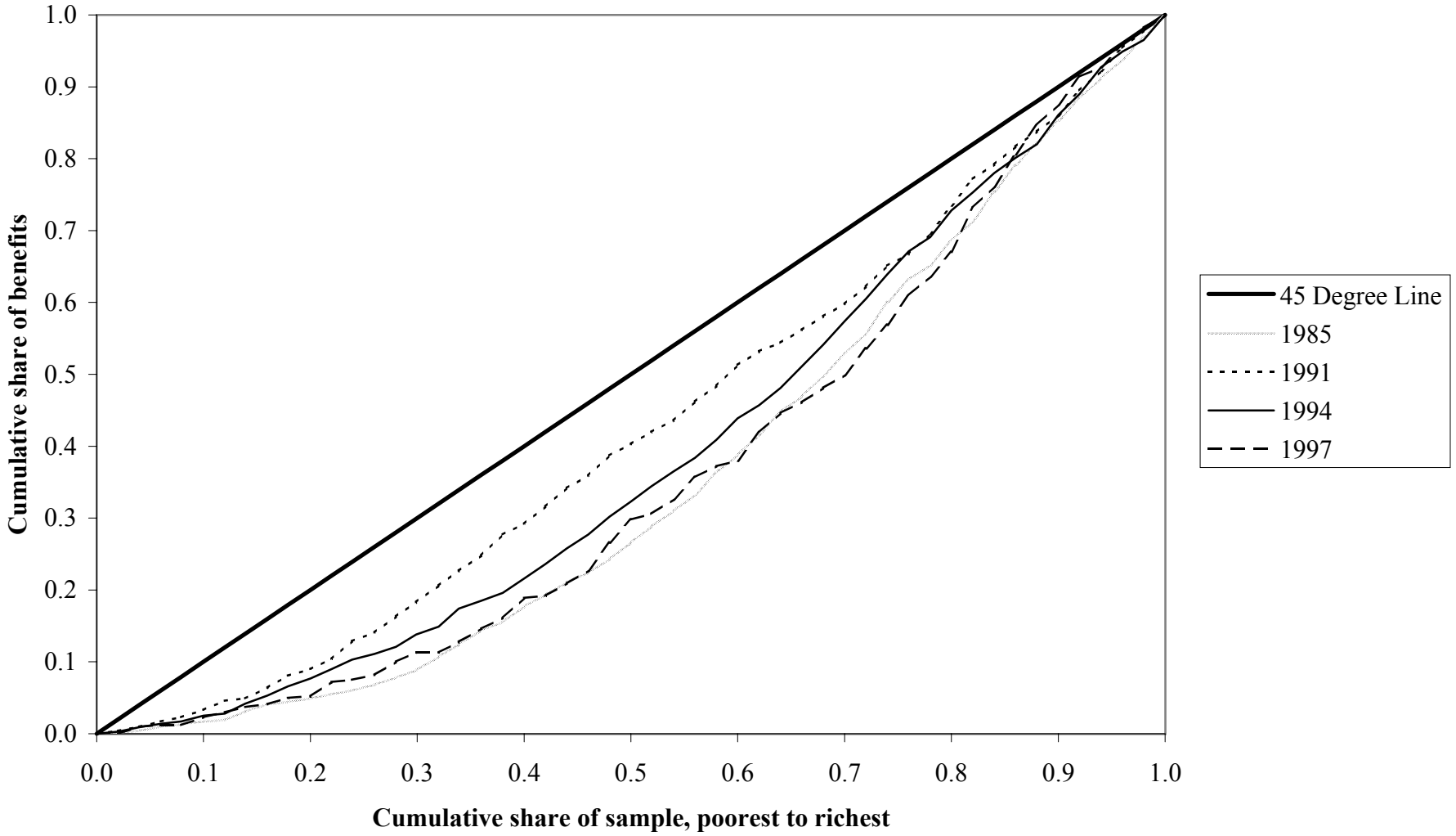

Figure A16 - Concentration curves for health center care, ENNIV surveys, 1991 domains

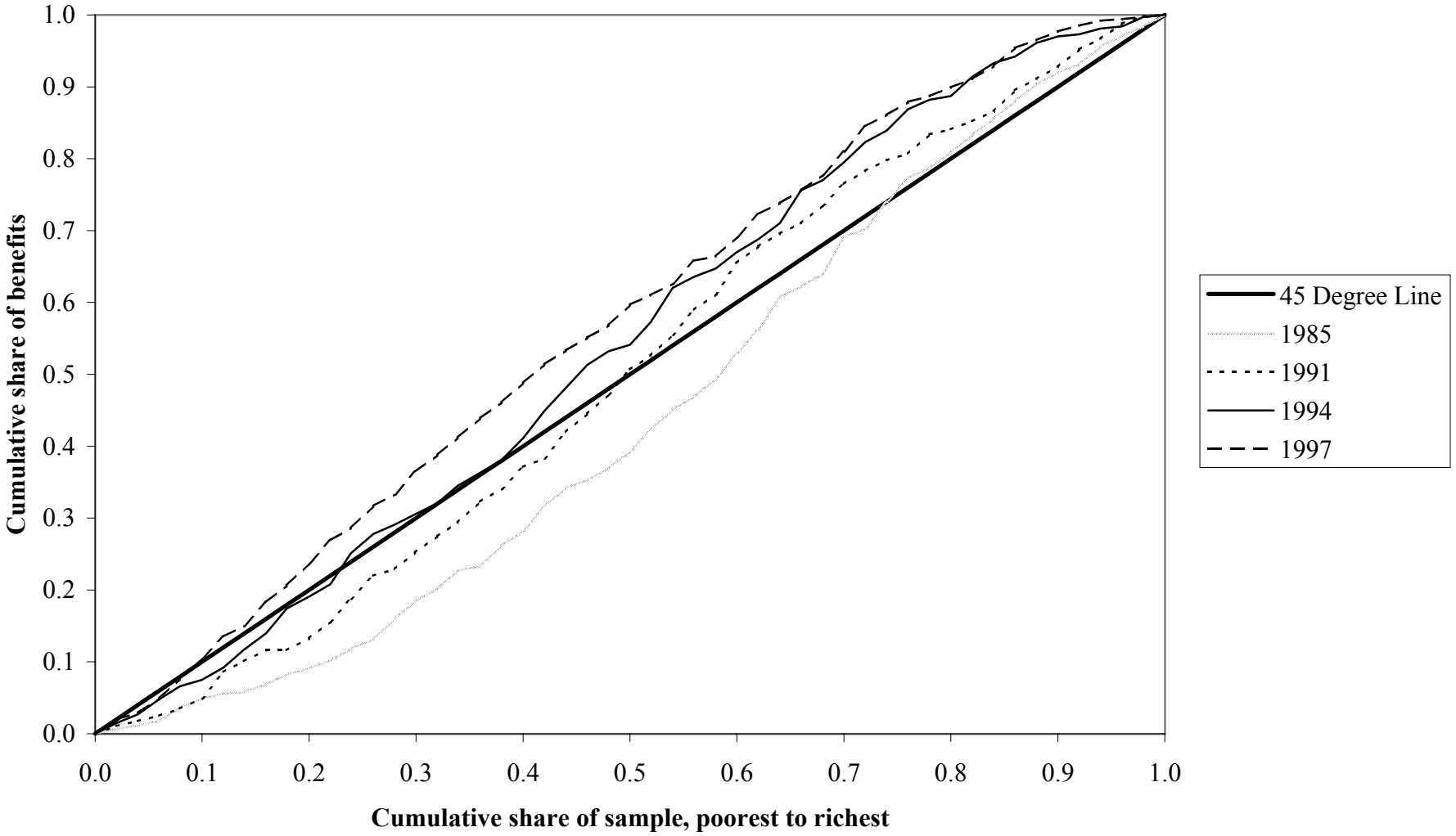

Figure A17 - Concentration curves for *vaso de leche* program, ENNIV surveys, 1991 domains