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Killing Two Birds With The Same Stone? The Effectiveness Of Food Transfers On Nutrition And Monetary Poverty

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Currently popular multidimensional approaches to poverty face the challenge of being translated into effective poverty reduction strategies. Central to this challenge is identifying policy interventions that can generate mutually reinforcing outcomes across different dimensions. With this aim we assess the impact of one particular intervention - food transfers- on both monetary and non-monetary dimensions of poverty in Peru. Using household survey data we find that the overall impact of the transfers is progressive from both an income and a nutritional perspective, though much of the benefit is nevertheless captured by the non-poor. In terms of nutritional impact, we find that food transfers increase household access to food, but that their impact on child malnutrition is not statistically different from the effect of other income sources. In terms of impact on monetary poverty, we find that the direct impact of food transfers is enhanced by the incentives they provide to increased work effort for certain groups. Overall, our results suggest that the pursuit of different poverty reduction objectives can build on significant synergies between objectives, though much could still be done to enhance the nutritional impact of food transfers in Peru.

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Introduction

Recent debates on poverty have been characterised by a growing interest in multidimensional approaches (e.g. Sen 1999, UNDP 1997, World Bank 2000). Lesser attention has been given, however, to the challenge of designing poverty reduction strategies whose impacts on different dimensions of deprivation are mutually reinforcing. This paper starts filling this gap by analysing the effectiveness of a specific policy instrument in alleviating both non-monetary and monetary dimensions of poverty. We consider food transfers in Peru as they have been very popular with both the government and foreign donors since the crisis of the early 1990s. As a result, food transfers now represent the largest direct public transfer in Peru, reaching about 40% of Peruvian households and providing about a quarter of household income to their beneficiaries. We consider the impact of the transfers on monetary poverty and malnutrition[1] as both types of deprivation are very high in the country: consumption poverty in 1997 was 51%, and long term malnutrition among children 0-5 (stunting) was 24%.

Food transfers can play an important poverty reduction role under both the nutritional and the monetary poverty profile: they aim at increasing food availability and therefore reduce malnutrition, and they accrue to the household as an income transfer in-kind, with consequences for estimated income poverty. At the same time, theoretical considerations raise doubts on their effectiveness both in terms of improving nutrition and alleviating monetary poverty. From the point of view of nutrition, food transfers might not succeed in increasing food consumption because of fungibility in the household budget. Further, if not accompanied by interventions complementary to increasing availability of nutrients (as seems to be the case in Peru, World Bank 1995) they might have a negligible nutritional impact. From the point of view of the reduction of monetary poverty the transfers might create disincentives to labour market participation, therefore resulting in a lower net increase in household resources than the value of the transfer. Other more efficient measures would therefore appear as preferable for the task. It should also be noted that there might be behavioural second order effects by which the impacts that food transfers have in one of these dimensions reinforce or hinder their effectiveness in the other.

In the light of these considerations, in this paper we aim to assess the performance of food transfers in three respects: their ability to reach the poor, defined in terms of both monetary and non-monetary indicators; their impact on different types of deprivation; and the extent to which their effects on different deprivations reinforce or hinder each other. Before proceeding we have to stress that, for the purpose of this paper, food transfers are defined as in-kind transfers of food, whether through subsidies, direct distribution, supplementary feeding etc., from either national or international sources and independently from the modality of acquisition of the food itself (e.g. from own acquisition with own or donor's funds or received as programme aid). By adopting this aggregate view[2] we will be able to provide a complete picture of their distributional impact as well as of their overall behavioural impact. The latter is particularly important as household behavioural responses mediate the effect of the transfers on poverty (e.g. by modifying food consumption patterns). It should also be noted that in the Peruvian context no overall assessment of this kind has ever been performed, though specific and partial assessments of particular outcomes exist (e.g. Cueto and Chinen 2000).

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[1] For recent critical evaluations of overall poverty reduction efforts in Peru are Shady (1999) on targeting effectiveness and Shady (2000) on the allocation of the expenditure by the Peruvian social fund, FONCODES.

[2] As shown below, there is a large extent of overlap between programme recipients and, apart from two major programmes, many have limited coverage. These circumstances make it difficult to separate out the effects of different programmes – not least as the household decision maker might allocate transfers to household members on the basis of an overall strategy, rather than respecting the programme intended allocation.

This paper is therefore organised as follows: section 1 will briefly review the main issues discussed in the literature on food transfers, identifying those which have the greatest bearing on the anti-poverty impact of the transfers, and drawing suggestions on how the impact of food transfers can be evaluated. Section 2 will introduce the data set which will be used and some of the methodological choices which it poses; section 3 will describe the Peruvian system of food transfers, and section 4 discusses whether the transfers are reaching the most deprived in terms of income and nutrition. This preliminary analysis will provide a useful background for our discussion of the behavioural effects of the transfers Section 5 will assess the effectiveness of transfers in alleviating malnutrition. As we do not have direct nutritional indicators but for children under 5, our strategy to conduct such an assessment will be two pronged. An indirect assessment will be provided by assessing the degree of fungibility of food transfers in household budgets, while a direct one will consider their impact on children under 5. Section 6, in contrast, will analyse the impact of these transfers on monetary poverty by factoring in their impact on labour market behaviour. Section 7 will briefly consider whether the pursuit of both monetary and non-monetary poverty reduction objectives appear to be compatible in the case of food transfers, and a final section summarises our findings and concludes.

1. The anti-poverty impact of food transfers and household behaviour

In the microeconomic literature the main arguments debated with respect to the nutritional impact of food transfers are related to the reasons for, and the effectiveness of, trying to distort household consumption patterns (Thurow 1974, Moffitt 1989) to increase food consumption. From the point of view of food transfer's impact on monetary poverty, concerns are generally raised – on these as on other income transfers – on the endogeneity of household resources and on the possibility that household behaviour might offset some of the reduction in poverty which would be otherwise experienced (Danziger, Haveman and Plotnick 1981).[3]

1.1. Transfers and household access to food

A central characteristic of food transfers is their in-kind rather than in-cash nature. In standard consumer analysis this makes them potentially distortionary, when compared to the pure income effect of lump sum cash transfers. In theory, in fact, if the transfer is marginal (i.e. consisting of a full or partial subsidy which affects the price of the marginal unit bought) and the goods cannot be resold, the transfer introduces a deadweight loss for the consumer by inducing "over-consumption" of the good.[4] Only if the transfer is infra-marginal or can be entirely resold, would its effect be equivalent to a lump-sum transfer. In this interpretation, therefore, food transfers are an inefficient policy instrument as they can distort household behaviour (and their inefficiency would be revealed by increases in the consumption of the good being transferred or subsidised).

Such logic, however, can be turned on its head as the superiority of cash over in-kind transfers rests on the exclusion of "paternalistic" societal concerns, such as for non monetary dimensions of well-being. If these other elements are considered, the imposition of a constraint on household choices can be viewed as the explicit objective of the transfer rather than a distortion. In this alternative view, therefore, whether in-kind transfers improve non-monetary dimensions of wellbeing (e.g. nutrition) more or less than cash transfers depends on their respective impact on the demand for

[3] "Some have charged that the incentives implicit in income support programmes discourage private work and savings and reduce capital accumulation" (Danziger, Haveman and Plotnick, p. 975).

[4] The deadweight loss arises as the consumer could attain higher utility if he was allowed to freely resell the marginal units.

goods which are proximate determinants of achievements in those other dimensions.[5] Similarly, another line of argument to support in-kind transfers posits the existence of a principal-agent problem between the government and the head of the household, if the head makes all consumption decisions at the household level, but attaches a lesser weight to child welfare than society (Ross 1991). The introduction of subsidies rather than cash transfers might therefore be justified as it locks in the household in a more desirable consumption pattern from society's point of view.

Other arguments which do not invoke paternalistic preferences can also be made in favour of in-kind transfers. In second best situations in which there are discrepancies between individual and societal costs (e.g. when there are externalities), in-kind transfers might raise societal welfare (Guesnerie and Roberts 1984). Once again, the in-kind nature of the transfer, by "distorting" consumer behaviour, brings it closer to societal preferences. Another case in which such a distortion is seen as positive arises if the donor cares about the beneficiary's consumption of a good rather than utility – an hypothesis supported by concerns as varied as Tobin's (1970) "specific egalitarianism" (where the definition of equality has a specific commodity basis, as opposed to "general egalitarianism" where equality is measured in terms of money), or concerns for basic human rights. In such a case, the donor might find in-kind transfers more effective than cash transfers as the former operate through the price elasticity of demand rather than the income elasticity (Thurow 1974). Furthermore, in-kind transfers might appear desirable on the basis of targeting or administrative concerns (though this is not necessarily the case with the delivery of food), or on the basis of political economy considerations: for instance the greater acceptability of in-kind transfers over cash hand-outs because of their perceived ability to bind recipients' choice.

Finally, a different strand of arguments in favour of food transfers can be built on the basis of the literature on collective models of household behaviour (Haddad, Hoddinott and Alderman 1997). This suggests that the impact of transfers in general might be crucially affected by the identity of the recipient, if different household members have different preferences and income is not pooled.[6] Some intrinsic characteristic of food transfers could therefore result in an allocation of the benefits which would favour the achievement of nutritional objectives. It has been noted, for example, that "food stamps are not directed at women per se, but because women are the main food purchasers, the delivery mechanism creates an entitlement to the transfers" (ibid. p. 278), and this might justify the differential impact that food stamps have on expenditure patterns when compared to other sources of income.[7]

These theoretical debates hinge on the empirical question of whether in-kind transfers are fungible or not, as shown by their impact on household behaviour when compared to monetary transfers. As few data sets offer opportunities for direct comparisons of in-cash and in-kind transfers, assessments are performed by estimating demand equations, and comparing the effects of in-kind transfers to those of other sources of income. An interesting example in which direct comparisons were possible was the Puerto Rican case, where the food stamp programme was effectively converted into a cash programme in 1982. Moffitt (1989), among others, found that the conversion had virtually no effect on consumption patterns, probably due to the fact that the transfers were

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[5] Note that lump-sum transfers operate through the income elasticity of demand, while in-kind transfers impose a kink in the budget – their effectiveness depends therefore to the extent in which they are marginal (and to the price elasticity of demand if they consist of goods subsidised up to a point).

[6] Duncan (1997), for example, finds evidence that "food composition changes [with the proportion of income which accrues to women rather than men}, with nutrient intake rising faster as women's income increases". Further, "the evidence on child health outcomes is consistent with this interpretation: maternal income has a significantly larger effect on the weight-for-height and height-for-age of children than paternal income" (p.164)

[7] Such a claim, however, needs to be tested with respect to the specific nature of a given programme. Unfortunately, we will not be able to specifically test for it.

inframarginal for most individuals, and that there were sufficient opportunities for trafficking in stamps so as to make them fungible for individuals who may have been constrained in their choices.

Different insights characterise a review (Currie 1993) of child support programmes in the United States, which evaluates the relative effectiveness of different cash and in-kind transfer schemes from the point of view of children's well-being. It is suggested that "in-kind transfer programmes have stronger effects on children than cash transfers, and that programmes that target specific benefits directly to children have the largest positive effect", though admittedly the evidence is incomplete (ibid. p1). At the same time, when debating the related issue of whether transfers affect individual behaviour in a different way than non-transfer income, a review of the effects of welfare payments in the US by Haveman and Wolfe (1995) seem to find a lesser impact of transfer income on child success in life (e.g. test scores) than other income sources. Recent results concerning the South African pension scheme point, however, to the sensitivity of the results to the specification chosen (Case and Deaton 1998), and in particular whether measurement error is accounted for.[8]

1.2. Transfers and household monetary resources

Contentious issues arise as well with respect to the impact of food transfers on monetary poverty, and they centre on the potential endogeneity of households' constraints. The existence of a transfer can cause behavioural responses, such as changes in labour market behaviour, which might be counterproductive for the achievement of the objectives of the transfer itself.[9] Of these behavioural responses, it is labour market behaviour which has received most attention, both because many transfer programmes are linked to labour market participation and because of the centrality of the labour market as a source of livelihood.

In a standard consumer model "aggregate work effort is, on balance, expected to be lower with than without transfers …" (Danziger et al. 1981, p. 980) if leisure is a normal good, though such a prediction needs to be empirically tested. If verified, it would imply a lower net impact of a given transfer programme on monetary poverty than if the transfer was added to the household *ex ante* income.[10] The consequences of such a reduction in work effort in terms of poverty reduction can be seen again to depend on the concept of welfare that is measured – in general, however, even if using a welfarist concept, the circumstance that more leisure is being enjoyed would escape an assessment of monetary poverty.[11] It should, however, be considered that if transfers are really able to reallocate time from work effort to "leisure", this could have positive effects on other potential objectives of poverty alleviation strategies. Transfers could for example enhance time devoted to child care, a factor which in itself improves children's nutrition and healthy development (e.g. Engle et al. 1997).

1.3. Towards an empirical assessment

1.3.1. Testing the impact of transfers on nutrition

The arguments presented in the previous section suggest that in-kind transfers might have problems in achieving the poverty alleviation objectives for which they are devised, and calls for an empirical

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[8] We will test the robustness of our results to different specifications and measurement error in our empirical work in section 5.1.

[9] Further, endogenous changes could affect other sources of non-earned income, such as remittances, and household structure.

[10] Household income net of the transfer is lower, in fact, of *ex ante* income. Consider that Mr. T has (ex-ante) earnings of 50 pounds. When the transfer is introduced he receives 20 pounds of transfer but decides to enjoy more leisure so that he earns only 40 pounds. His income becomes of 60, rather than 70.

[11] See Deaton and Zaidi (1999) for a review of the problems in valuing leisure.

assessment. As far as their nutritional impact is concerned, the fungibility of household resources might mean that food transfers do not succeed in increasing household overall access to food. It should also be noted that nutritional considerations (World Bank 1995) imply that interventions only focused on food might not address other key obstacles to improved nutrition (e.g. education on nutritional and hygienic practices, child rearing etc.) which might be important determinants of malnutrition in certain contexts. Even if they are not fungible and succeed in increasing food consumption, therefore, food transfers might not succeed in improving nutritional outcomes.

A major problem in performing an evaluation of the nutritional impact of these programmes is that in our data set outcome measures (anthropometrics) are available only for children under 5. This implies that most of our analysis on the impact of food transfers from a capability poverty perspective will be conducted in terms of their ability to alleviate child malnutrition. This is a crucial part of the overall nutritional impact of the programmes, as the age group 0-5 is one of the groups most vulnerable to malnutrition, together with pregnant and lactating mothers. Further, it is a group whose malnutrition has serious long-term consequences, and therefore often features among the intended beneficiaries of food transfers programmes. Nevertheless, an assessment only based on their nutritional status might still be quite limited.

In what follows, therefore, we will try to include wider considerations by pursuing a two pronged strategy. We will start by assessing the transfers' ability to increase household food consumption with a test of fungibility of in-kind transfers in the household budgets. Such an assessment, though significant, will still ignore the key question of the intra-household distribution of food, which might be affected by the control different household members have over the new resources. Further, such an assessment can be suggestive of nutritional outcomes, but is reductionist in that it focuses on food expenditure, therefore ignoring other important determinants of nutritional status.[12] We will then directly focus on the nutritional status of children under 5, testing for an independent effect of food transfers. In this way, though we will not be able to trace the complex processes which ultimately determine the nutritional impact of transfers, we will be able to observe their reduced form effect, at least for one specific group of household members.

1.3.2. Testing the impact of food transfers on monetary poverty

From the point of view of reducing monetary poverty, food transfers can be considered inefficient as they might stimulate endogenous changes to other sources of household income – most notably through disincentives to labour market participation and effort. We will assess whether this is the case by focusing on their impact on labour market behaviour. A similar issue has been investigated in the Peruvian context by Cortez (1999), who considers the impact of food transfers and child care programmes (the so-called *wawa wasi* programme) on female labour supply. He finds an important joint effect of these transfers on female labour market behaviour, with a significant increase in the hours of work provided by women. Cortez's study suggests, therefore, that the transfer programmes he considers lower the opportunity cost of working, though such an effect can be seen as the sum of various effects potentially working in opposite directions.[13] Further, Cortez's analysis is partial as it fails to consider that transfers might also generate labour supply responses on men. Finally, as his paper aggregates over different types of child related programmes (care and food transfers) it is not

[12] Other concerns which our analysis will not address are related to supply side responses, such as for example those on the disincentives food transfers might provide to food-security and local food production.

[13] That is the effects of the *wawa wasi* – which directly increases the amount of time women can spend in other (possibly market) activities than child care – and those of food transfers. In the case of the latter, the income effect could decrease labour supply, though such an effect could be tempered or overturned by others (such as the reduction in the time needed to prepare food, or some positive effect on labour supply due to the improved nutritional status of the workers).

clear what type of impact we can expect food transfers *alone* to have. Our analysis will therefore have a sharper focus than Cortez (1999) as it focuses exclusively on food transfers and analyses a different (more recent) data set. Further, as discussed later, we will adopt a different estimation strategy, and we will be able to link labour market responses to nutritional outcomes. Finally, by considering male labour market behaviour as well as female, we aim at obtaining a more precise picture of how household income is likely to be affected by changes in the amount of food aid provided.

1.3.3. Considering whether impacts in different dimensions reinforce each other

After having assessed the impact of food transfers on nutrition and monetary poverty separately, we will consider the potential interdependence between achievements in these two respects. Several possible links could determine such an interdependence. One example we mentioned is through changes in the allocation of mothers' time between work and leisure. If transfers increase leisure and in so doing increase time for child care there might a positive indirect effects on child development and nutritional status.[14] Another possible link is the nutrition-based efficiency wage hypothesis, by which nutritional status affects working capacity so that individuals can find themselves in a poverty trap (Dasgupta 1993) – though the empirical evidence for such models remains unconvincing.[15] Data constraints do not allow us to consider in details the issue of time allocation, and the nutritional impact of transfers on adult.[16] We will be able, however, to construct a "without the transfer" counterfactual which factors in both the direct effect of food transfers on nutrition and the indirect effects of the endogenous changes in household income caused by the transfers. Such a picture, though arguably partial, should provide us with an insights on the magnitude of the effects considered.

2. The data

The data we shall use in this paper are the 1997 round of the ENNIV (Enquesta Nacional NIveles de Vida) survey, collected by the Instituto Cuanto in Lima. This household survey follows the LSMS model, gathering information on housing, education, health, economic activity, consumption and assets of the households. The survey is representative at the country level and covers 3843 households. An important feature of the ENNIV 1997 is that it includes a new detailed module on access to social programmes, which will allow us to investigate the impact of food transfers.[17]

In this analysis we have generally relied on the data as provided by the Instituto Cuanto (see Cuanto 1998). The most notable difference in our treatment of the data from theirs concerns the valuation of food transfers, for which we have followed the suggestions of World Bank (1999).[18] The phrasing of the questionnaire led, in fact, to some ambiguity in the interpretation of the questions on

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[14] Ideally, however, one would want to estimate the overall effect on child nutrition by considering both the income effect of the transfer (caused by the transfer and the changes in labour market behaviour) and the leisure-care link. In a non-transfer related context, in fact, it has been found that if programmes increase women's earnings the income effect offsets the negative one of diminished care (Haddad, Hoddinott and Alderman 1997); unfortunately data on time used for care is not available in the ENNIV 1997 survey.

[15] For refutations of the hypothesis see for example Swamy 1997, and literature quoted in Dasgupta (1997).

[16] Dasgupta (1997) notes that these effects are not properly captured in cross-sectional "reduced forms" models which substitute "nutrition intake (a flow) … for nutritional status (a stock) in modelling the links between the latter and work capacity" (p.6, fn 2).

[17] More details on the survey are presented by Cuanto (1998).

[18] By and large we have therefore followed the way the Instituto Cuanto has computed the income variable. It includes information on the incomes for the principal and secondary jobs of household members 15 and over – whether from a dependent or an independent activity, in the last 7 days or in the last 12 months if they did not work in the last 7 days – as well as self-production, rent or interest from assets, income from regular as well as extraordinary transfers, food from transfers and other incomes.

the value of the food transfer received.[19] Further, the hypotheses made in the imputation of an annual value to food transfers can be questioned.[20]

The major problem posed by this data in relation to the issues we want to explore is represented by the income variable. As is often the case in developing countries (Deaton 1997), the ENNIV surveys seem to measure expenditure more accurately than income,[21] and it is common practice to use expenditure data to measure poverty when using these data. Even though expenditure is arguably a much better welfare indicator than income (ibid. and literature there cited) this would not have been appropriate for the purpose of our analysis. We need in fact to use the largest income components, i.e. the wage information, when looking at labour market behaviour in order to simulate the impact of the transfers on the distribution of income. While we seem condemned to rely on a potentially badly measured variable, we are aware of the shortcomings of our data and we will try to factor in the presence of error in measurement in our estimates. Further, when analysing the distribution of the transfers we will compare the results obtained when focusing on income to those obtained with expenditure, in order to triangulate our insights. Another consequence of our adoption of income rather than consumption as a welfare indicator is that in assessing monetary poverty we will generally draw our conclusions looking at what happens at the bottom of the distribution, rather than setting a poverty line in the income space.

3. Food transfers in Peru

Food transfers in Peru are administered and distributed by a plurality of actors and programmes, many of which are donor driven,[22] (Cortez and Calvo 1997). The Ministry of Education runs one of the major programmes, the Vaso de Leche (glass of milk), which in 1995 reached 5 million children through a network organisation delivering milk through "club de madres" (mothers' associations). FONCODES, the Peruvian Social Fund, runs a school breakfast programmes benefiting children of primary school age (230 000 children in 5 of the poorest departments were reached by the programme in 1994). The PRONAA (National Food Assistance Programme), administered by the Ministry of the Presidency runs a variety of nutritional interventions,[23] while other important programmes are those run by the Health Ministry, such as PACFO, a special programme concentrating its activities in the 5 poorest departments of the central Sierra region, and PANFAR (the Nutritional Programme for Families at High Risk) co-executed with the NGO PRISMA. Other big NGOs involved in delivering food aid include ADRA-OFASA which administers the Programa de Nutricion Infantil financed by USAID; and CARITAS, which is involved in the distribution of food in the Food Security (Saavedra, 1999). [24]

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[19] World Bank (1999) points out, for example, how many households seem to have confused the value of the donations they were receiving daily with the value for the entire recall period, giving a value of 4 dollars (in 1997) as the value of a daily donation for two children, while that corresponds to the value of the weekly donation for two children (five times a week).

[20] Originally the daily food donations were multiplied by 365, even if most programmes work only some days of the week, and not all year round. By adopting the adjustments suggested by World Bank (1999 p. 62) the estimated amount of total food aid appears much more consistent with the expenditures reported by the major food programmes.

[21] A symptom of potentially significant underreporting is that in the 1997 survey 56% of the population is dissaving.

[22] For example in 1991, donor food assistance amounted to at least $150 million, while the central governments budget was US $186 million (Cortez and Calvo 1997).

[23] In 1996, for example, it distributed 176 000 daily rations to children of school age; 134 000 metric tonnes of food were distributed to communal kitchens while 2440 of them (serving about 2.5 million people) received also direct subsidies; 6300 metric tonnes of food went to 107 000 beneficiaries among pregnant and lactating women, children at high risk of malnutrition and elderly people; 34 metric tonnes of food were distributed in emergencies to 256 000 people (Cortez and Calvo 1997).

[24] The Food Security programme (PRODESA) aimed to reach 43000 under 5 years old and 8000 pregnant mothers, while the Programa Nacional de Nutricion Infantil in 1999 reached almost 50 000 children and pregnant mothers (Saavedra, 1999).

The large presence of NGOs and the heavy reliance on local self-help groups and associations in the delivery and preparation of food are among the most striking features of this system. Though the high levels of malnutrition, especially among children (24% of children under 5 were chronically malnourished in 1997), are behind the high reliance on food transfers, institutional factors also play a role. Communal kitchens, for example, emerged as a self-help solution to the hardship of the late 1980s and early 1990s and provided an institutionally viable mechanism to deliver benefits in a very decentralised way to poorer sections of society. Further the activities of these organisations appear to have spillover effects in terms of women empowerment and community development. Pursuing these ancillary objectives seem to underpin much of the support which the programmes receive from the government as well as from international donors.

Assessments of the programmes' performance are however not necessarily in agreement. From a distributional point of view, some find that "the pattern and level of efficiency in terms of targeting … [is] better for nutritional programmes than in the general provision of education and health services, and similar to those generally observed in Latin America" (Saavedra, 1999, p.12 own translation). Similarly, a study by Cortez and Calvo (1997) found that in 1994, the glass of milk programme had a distribution "sufficiently close" to the proportion of malnourished children by region.[25] In line with Cortez and Calvo's finding, Younger (2000) finds feeding programmes, and especially the glass of milk, "very progressive" (p.37), though this judgement seems to have been greatly influenced by the situation in the early 90's. Other commentators, however, have been quite critical of the distributional impact of the transfers. World Bank (1999 b) for example points out the heterogeneity of performance of different programmes, with only 4 programmes (out of 16 programmes reviewed) devoting more than 30% to the 6 Departments where 35% of the malnourished children are found. The other programmes, among which the glass of milk and the communal kitchens, were found on the contrary to be regressively targeted, with a disproportionate amount of resources going into Lima metropolitan area. Among the reasons identified for this performance is the variety of targeting mechanisms, often specified as very flexible guidelines, which different programmes adopt.

As far as the nutritional impact of these programmes is concerned, the system as a whole[26] was found to be based on "little critical analysis of the basic premises that food distribution is necessary, sufficient or cost-effective for achieving national nutritional goals" (ibid. p. 5). Two types of criticisms seem to underlie this view. A first criticism stems from concerns on whether distributing food is the best way to reach nutritional objectives, as existing programmes do not pay enough attention to nutrition-related household behaviour (hygiene, caring practices, breastfeeding, weaning) which can place serious constraints to household's ability to translate income into nutrition.[27] A second more general criticisms is that the system as a whole seems to be characterised by the lack of a clear general framework because of the plurality of ancillary objectives pursued on

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[25] In Appendix 4.1. we re-examine this claim for 1997, with respect to both the glass of milk and the school breakfast programme, as these two programmes cover 50% of the national budget for food programmes (World Bank 1999) and find that the percentages of beneficiaries reflect the extent of malnutrition more in the case of the school breakfast programme than in the case of the glass of milk. At the same time, however, the glass of milk reaches more stunted children than the school breakfast programme, though even in the regions in which it is most successful the glass of milk programme misses one third of its intended beneficiaries.

[26] As shown by the National Plan for Nutrition and Food Consumption elaborated in 1998 with the aim of creating an overall framework for the different nutritional interventions

[27] It is interesting to note, however, that in Peru food transfers seem to have some advantages over other form of interventions. World Bank (1995) noted "unforeseen advantages in distribution of food in Peru now", including the fact that "people place greater value in receiving food than money, […] purchasing by some programmes is greatly encouraging local production … [and that] large programmes are enjoying economies of scale by eliminating the role of intermediaries."

the assumption that distributing food is *per se* sufficient to insure nutritional improvements. These ancillary objectives include transferring income, fostering community organisation and encouraging school attendance.

A few studies have assessed the impact of the transfers on different objectives. Cuanto (1997), for example, tries to evaluate the nutritional impact of communal kitchens on the population at risk (defined as children under 6 and pregnant and lactating mothers). The report finds that 23% of the children under 6 which receive food from the communal kitchens are stunted. It is highlighted, however, that as this programme distributes cooked food to women it is hard to trace it nutritional impact – intra-household allocation mechanisms as well as nurturing practices, in fact, play a major role in mediating their effectiveness. Cueto and Chinen (2000) examine the educational impact of the school breakfast programmes in rural schools and find that food transfer receipt increases short term memory, haemoglobin and school attendance, as well as diminishing dropout rates. At the same time they do not find improvements in stunting, BMI (body mass index) or test results. The duality of results in terms of educational impact is explained as food transfer receipts create an incentive for food attendance, while the preparation and serving of the breakfast subtracts up to two hours a day from teaching time.

These results reinforce the idea that the main features of the Peruvian food transfers are a significant investment of resources, a plurality of actors and objectives, and great heterogeneity in performance.[28] Further, the geographic concentration of the programmes has been noted. The complexity of the food transfers system is brought out by table 1. The first row shows that 39.2% of the households is receiving food aid and provides a break-down of the beneficiaries by region. The rows below present how beneficiary households are distributed by program and region, as well as how many of them receive more than one programme. Finally, the average level of benefit and average pre-transfer income per household are presented.

Table 1 Distribution of beneficiaries and type of benefit received, by region (hh.%)

	All of the country	Lima	Costa urbana	Costa rural	Sierra urbana	Sierra rural	Selva urbana	Selva rural
Receiving food aid	39.22	31.70	22.29	50.48	27.54	65.17	29.80	58.56
Of which:								
School Breakfast	54.81	44.28	63.30	40.76	68.03	64.78	53.72	34.70
Glass of milk	65.23	68.65	48.62	64.33	46.72	72.91	54.55	69.86
Communal kitchens	9.77	17.47	10.09	17.83	8.20	4.93	5.79	5.02
Club de madres	5.83	2.00	1.83	6.37	3.28	6.90	10.74	15.53
PANFAR	1.77	-	-	4.46	0.82	2.96	1.65	2.74
Food for work	1.07	0.32	-	1.91	0.82	1.72	0.83	1.37
Parochial canteen	0.70	0.97	0.92	-	1.64	0.49	-	0.46
Direct food donation	2.82	1.03	0.92	-	3.28	4.68	0.83	5.02
Receiving 2 programmes	31.26	29.38	47.71	32.48	50.00	23.65	42.15	22.37
Receiving 3 programmes	24.08	20.11	17.43	15.29	18.03	36.21	15.70	13.70
Receiving 4 or more	4.87	2.90	1.83	4.46	4.10	7.64	2.48	5.02
Average level of benefit per beneficiary household♠	1942	2128	2147	1453	2033	1633	2569	2377
Average pre-transfer income♠	16461	15588	10653	6398	8481	4368	15172	9090

♠ in Lima prices

[28] Some of this heterogeneity might reflect changes over time in the modus operandi and resources of the various food transfers programmes, as the studies consider adopt different data sets and reference periods.

The key elements which emerge from this table are that, overall, in each region there is a higher percentage of beneficiaries in the rural areas than in the urban ones, and there are lots of fluctuations across areas. Geography is likely to play an important role in determining the reach of the transfers, as Peru's topography is such as to put important barriers to the delivery of goods, especially to the rural areas of the Sierra.[29] The majority of the beneficiaries is receiving the school breakfast programme and the "glass of milk" programme, followed by the communal kitchens, which however are strongly concentrated in the coastal regions. As highlighted by the middle part of the table the system is characterised by a high degree of overlap (almost 60% of the beneficiaries receive more than one programme). The concentration of the programmes is such that many urban households enjoy two programmes, while the finding is reversed for 4 programmes or more. This might reflect the more narrow targeting of programmes such as PANFAR which operate only in certain areas at high risk of malnutrition. Finally in the urban areas the concentration of programmes is associated with higher benefits, despite higher average pre-transfer income level. It is tempting to take this as evidence of urban bias, though as the geographical pattern we find might reflect other factors – for example differences in household characteristics (e.g. average number of children) across the regions – it is difficult to determine it *a priori*. We will return to this issue in next section.

Before concluding this section, however, it is worth noting that no overall assessment of the transfers' performance has been conducted. Taking an aggregate view seems the best way to consider the distributional effects of the transfers. Further, the transfers' impact on poverty and malnutrition is likely to depend on overall household benefit (especially as there is a high overlap between programmes). Consider, for example, the reallocation of the budget to non-food items which together with other household behavioural responses mediate the effect of food transfers on achieved nutrition.

4.1. Are the transfers reaching the poor?

In the previous section we illustrated how a variety of programmes and modalities of distributing the benefits characterises food transfers in Peru. In this section we will analyse how effective they are in directing the benefits to the poor, as identified by household monetary resources and nutrition. We will start by considering the distribution of food transfers, from both perspectives. We will then consider the determinants of transfer's receipt. As mentioned in the previous section, in fact, alternative targeting criteria are adopted by different programmes, often rather flexibly. By considering *who* is effectively receiving the transfers we aim at shedding some light on *what* is driving the effectiveness of the transfers.

An important qualification of our results is that we will make the assumption that the benefit is equally shared among household members. The identification of individual beneficiaries is highly problematic as food transfers are distributed in a variety of ways – such as schools or communal kitchens or women's organisations – and are not always directly and exclusively given to the intended beneficiaries. Even if that were the case, however, the possible fungibility in household's resources would make it difficult to attribute the benefits to a subset of the household.

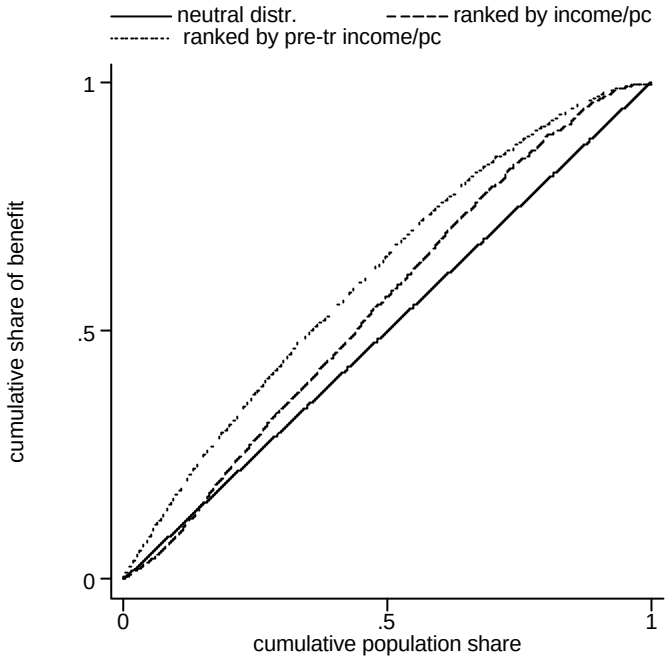
4.1. The distribution of transfers and the monetary poor

A first impression of the effectiveness of food transfers in reaching the monetary poverty is provided by the concentration curve in figure 1. The curve plots on the vertical axis the cumulative

[29] A rough check of the number of times households received food transfers showed that in Lima the average per year (over all food programmes) is 90 times, as compared to 36 in the Rural Selva. This seems indicative of the greater ease of administering food transfers in urban areas, though of course the amounts received could be variable.

percentage of the transfer and on the horizontal axis the cumulative percentage of population ranked by per capita income.[30] The 45 degree line shows how the benefits of the transfers should be distributed in order to have a neutral impact on the income distribution, so that the curves lying above it denote a progressive impact (Van de Walle 1998).

Figure 1 Concentration curve, obs. ranked by current and net-of-transfer household per capita income



We present two alternative curves – one obtained when ranking observations in terms of the current income distribution, the other obtained when ranking observations in terms of the current income net of the transfers. The curve obtained when ranking observations in terms of current income crosses the 45 degrees line around the 20th percentile, suggesting that transfers have a regressive impact on the bottom 20% of the income distribution. For the rest of the distribution, however, the transfers appear to have a progressive effect. It is interesting to compare this curve with the one obtained when ranking observations in terms of pre-transfer income. In this case, the curve shows an unequivocal progressive effect for the whole distribution as, because of the transfers received, some of the poor shift towards the middle of the distribution. It would seem, therefore, that while the transfers are contributing to improve the distribution, there is scope to improve their ability to reach the poorest, as well as to increase their share of the benefits.

Table 1 elaborates on this point by providing details on how the different income groups are benefiting from the transfers.[31] Table 2 illustrates how the regressive section of the curve in figure 1 depends on the lower than average benefit the beneficiaries are receiving (though the percentage of beneficiaries in the bottom quintile is higher than elsewhere). Further, while transfers represent an important source of income for the poorest, there is ample scope for improving the reach of the poor – the lowest 50% of the population (a share of the population corresponding to the one which is in consumption poverty) is receiving just 58% of the benefits, the lowest decile only 9%.

[30] The graph has been drawn taking into consideration sampling weights in order to replicate the true income distribution.

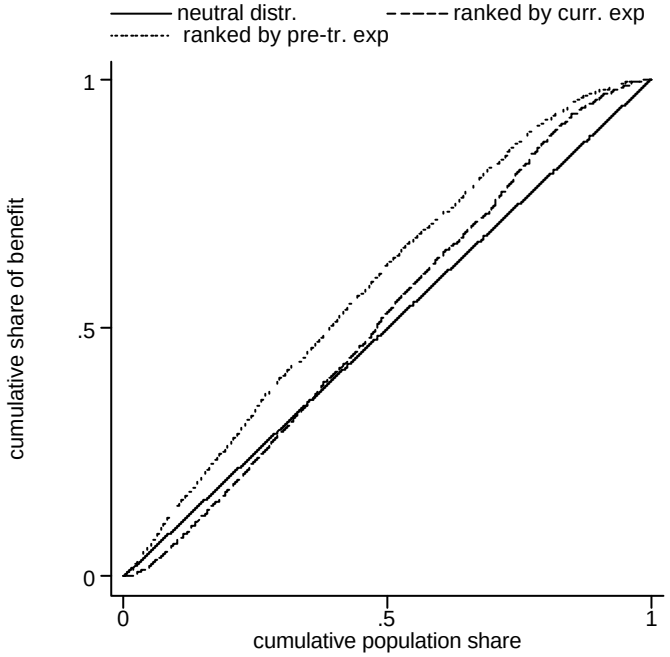
[31] Note that in what follows we are not factoring in the costs of delivering food transfers, which might be different across deciles. Note also that the second and third column when multiplied by the number of individuals in every decile, provide us with the amount of benefit which goes to each decile, which in its turn is presented as cumulated share in the first column.

Table 2 The benefits from food transfer by decile of hh. pc. income

	Cumulative Share of the transfer received	Beneficiaries as a % of population in that decile	Transfer per capita for recipients (1997 soles)	Share of transfer in income for those who receive food transfers
Peru		41.44%	341.01	26.10%
decile 1 (poorest)	8.51%	56.89%	210.88	55.34%
decile 2	21.89%	68.48%	276.31	32.95%
decile 3	34.59%	54.27%	330.28	28.95%
decile 4	45.96%	43.71%	367.44	24.44%
decile 5	57.86%	43.93%	381.26	20.24%
decile 6	68.98%	40.47%	388.77	16.64%
decile 7	79.72%	39.62%	382.49	13.64%
decile 8	89.64%	32.71%	428.47	12.12%
decile 9	96.86%	24.30%	419.71	8.78%
decile 10 (richest)	100.00%	9.56%	464.35	6.13%

As mentioned earlier, and suggested by table 1, there is a suspicion that our results are driven by measurement error in our income variable – the large share of income accounted for by the transfers in the poorest decile could suggest a significant underreporting of income for this group. We have therefore replicated the analysis using expenditure,[32] which is less likely to be contaminated by underreporting.

Figure 2 Concentration curve, observations ranked by hh expenditure per capita



[32] The expenditure indicator for the ENNIV 1997 includes expenditure on food items (including alcohol and tobacco); clothing and shoes; rent fuel and electricity; other expenditures for the house including maintenance, furniture and domestic services; health expenditures; transport and communications; cultural activities (including school expenditure) and leisure; other goods and services for personal care; and transfers. It is adopted here as household yearly expenditure per capita.

Table 3 The benefits from food transfer by decile of the hh. expenditure distribution.

	Cumulative Share of the transfer received	Beneficiaries as a % of population in that decile	Transfer per capita for recipients (1997 soles)	Share of transfer over expenditure for those who receive food transfers
Peru		41.44%	341	26.10%
decile 1	7.75%	56.37%	194	26.45%
decile 2	19.28%	59.82%	272	25.70%
decile 3	31.68%	58.88%	297	22.06%
decile 4	43.71%	50.86%	333	20.66%
decile 5	56.44%	48.09%	375	18.96%
decile 6	66.82%	39.21%	373	16.01%
decile 7	77.75%	37.13%	416	14.90%
decile 8	89.37%	35.23%	466	13.74%
decile 9	96.92%	21.09%	506	11.35%
decile 10	100.00%	7.29%	596	8.62%

Figure 2 shows a pattern similar to that found in figure 1, though this time the benefits start accruing progressively only to the individuals in the 30th percentile and higher. Similarly, when evaluating food transfers on the basis of the pre-transfers distribution of expenditure, they appear less progressive than they did from income perspective. This suggests that mismeasurement of income (or dissaving) in the lowest deciles affect our evaluation of the progressiveness of the transfers in figure 1.

This assessment of how the benefits are reaching the poor, however, does not consider other factors which might also affect the distribution of the benefits. As already mentioned, food transfers' receipt can cause changes in other sources of income by, for example, affecting labour market behaviour. Consider for example the case of someone who can just about make ends meet if the transfers did not exist – say that in a *without* transfer distribution he would be around the 40th percentile – and that, upon receiving the transfer, decides to work fewer hours, so as to maintain approximately the same place in the distribution. When ranked in terms of his *pre-transfer* income (defined as above as current income minus the transfer) he would appear as belonging to a lower percentile, so his receiving the transfer would show up as having a more progressive impact. In reality, however, receiving the transfer would be contributing less to decreasing his monetary poverty than consideration of his *pre-transfer* income would suggest. These kind of considerations, therefore, alerts us as to take these initial results as preliminary and to postpone an assessment of the overall impact of the transfers on monetary poverty to section 7, where we will be able to also factor in household behavioural responses to the transfer.

4.2. The distribution of transfers and malnourished children

In order to consider the ability of food transfers to direct their benefits to malnourished children, we have drawn a concentration curve for which the observations on children are ranked on the horizontal axis. The curve shows a distribution which is progressive, and more so than when considering a monetary distribution (note how more benefits are received by the lower deciles than when those are ranked in terms of income or expenditure, up to the 7th decile of the distribution). The benefits in the lower two deciles is rather limited, given that these are the malnourished groups – the lowest two deciles (and part of the third one) represent children below 2 standard deviations from the reference value (the 10th and 20th centile are respectively –2.82 and –2.18 of the standard

score distribution).[33] Further, when considering the disaggregated information presented in table 3 it is clear that a sizeable proportion in every decile of the nutritional distribution is reached by food aid. This results in only slightly more than one fifth of overall benefits going to the group which needs it most. The consideration that the transfers are not very effective at benefiting one of their main target groups should, however, be qualified by considering that we cannot ascertain yet how the distribution of child nutritional status would be if food transfers were not available (perhaps others who now appear as not malnourished could have been so if the transfers did not exist).

Figure 3 Concentration curve, observations ranked by height for age standard score

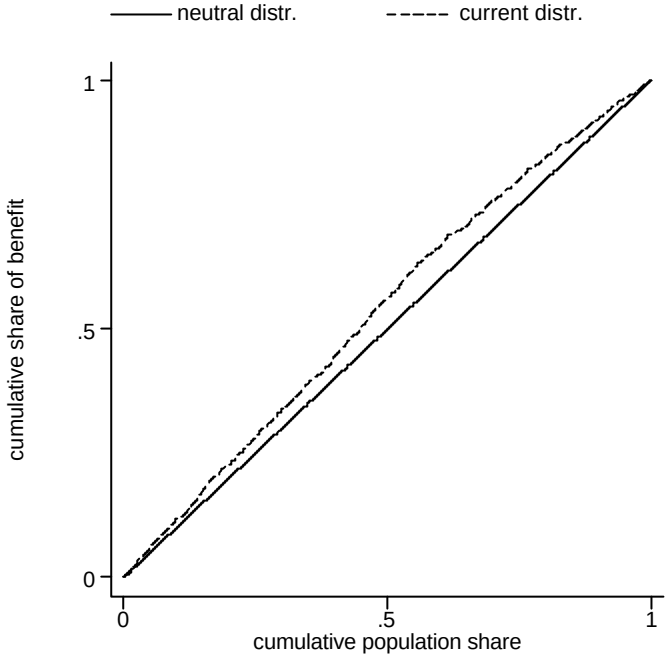


Table 3 presents the share of transfer in household resources both in terms of income and expenditure, since we found evidence of mismeasured income at the bottom of the income distribution. The share of transfer in expenditure appears to fluctuate less widely than the share of transfer in income, and appears again, therefore, more plausible.

[33] As for the other end of the distribution, only 1.2% of the children appear to show abnormally high standard score values (i.e. a standard score higher than 2).

Table 4 The benefits from food transfer by decile of the standard score for height for age

	Cumulative share of the transfer	Beneficiaries as a % of population in that decile	Transfer per capita (1997 soles)	Share of transfer in income for those who receive food transfers	Share of transfer in expenditure for those who receive food transfers
Peru		50.37%	339.45	30.97%	19.94%
decile 1	11.69%	66.74%	299.24	48.14%	26.78%
decile 2	23.25%	61.48%	321.01	29.95%	23.91%
decile 3	34.70%	56.01%	348.57	32.26%	24.96%
decile 4	45.92%	56.72%	337.09	28.36%	21.02%
decile 5	57.05%	53.86%	354.07	26.65%	22.18%
decile 6	68.18%	50.42%	376.12	26.62%	21.05%
decile 7	76.45%	41.03%	344.78	25.00%	19.45%
decile 8	84.89%	39.21%	368.15	46.40%	19.54%
decile 9	92.59%	38.56%	341.25	19.22%	17.70%
decile 10	100.00%	39.14%	323.43	17.37%	15.96%

The general conclusion of this sub-section is that, from both a monetary and a nutritional perspective, not much of the benefits of food transfers is captured by the poor, though transfers account for a large share of poor people's resources and their overall impact is progressive. To understand more of what is driving this finding, we now turn to analysing the determinants of food transfers receipt.

4.3. Who is benefiting from the transfers?

In the previous sections we found that food transfers are administered in Peru by a complex system, characterised by multiple coverage and a high degree of geographic variability. We also found that, even if they account for a large part of poor people's resources and they have a progressive effect on the distribution of monetary resources and nutritional achievements, much of their benefits are captured by individuals in the top deciles. In this section we will look in closer detail at the characteristics of the beneficiaries of food transfers and how these characteristics influence the probability of transfer receipt, as well as the amount received. This will help us explaining the distributive outcomes we presented, as well as laying the ground for subsequent behavioural analysis. Note how, as we are aggregating over different programmes – many of which are without any explicit targeting criteria – here we are interested in finding the overall criteria which determine, in practice, who accesses the transfers and how much they receive.

In table 5 we start by comparing some characteristics of beneficiaries and non-beneficiaries household.

Table 5 Household characteristics: Food transfer beneficiaries vs. non beneficiaries

	Beneficiaries	Non beneficiaries
Mean household per capita income	2131	4777
Mean household pre-transfer income per capita	1742	4777
Percentage of households where at least one child is malnourished	32.24%	17.97%
Household size	5.69	4.72
Average number of children (0-5)	1.1	0.6
Average age in the household	23.19	32.08
Head aged 60+	14.68%	28.79%
Female headed households	12.81%	17.31%
Households with the head being indigenous	33.28%	17.31%
Households living in rural areas	52.1%	24.6%
Proportion of total food consumption in overall expenditure	56.88%	36.57%
Proportion of private food consumption in total food expenditure	65.26%	100.00%

In line with the progressive impact of the transfers, we find that the income of beneficiary households is on average less than half of non-beneficiaries. Further, the chances of at least one child being malnourished are almost double for beneficiaries, indicating that nutritional targeting is indeed taking place, though imperfectly, as shown by the significant extent of undercoverage (18% of the households not receiving any transfer have at least one stunted child). Further, by comparison with non-beneficiaries, beneficiaries live in households which tend to be in rural areas, are larger in size, and are more likely to have younger members. Beneficiary households are also more likely to be headed by an indigenous person, while they are less likely to be headed by a woman.

Table 5, therefore, confirms some elements which emerged earlier, such as a higher percentage of beneficiaries in rural areas, where most indigenous people are found, and the intention of reaching children. At the same time, it alerts us to some important issues which will have a bearing later, when we perform our behavioural analysis. Beneficiary households have a higher share of food consumption than non-beneficiaries, which can be explained in terms of the fact that they are on average larger households (and particularly households with more children) as well as poorer.[34] When analysing the impact of food transfers on households' consumption choices we will need to come back to this issue, to discriminate between the importance of these factors from the possible effect of food transfers themselves in raising food consumption.

From the comparisons presented in table 5 we cannot draw any inference on how effective different criteria are in determining access to food transfers. We are particularly interested in finding out whether transfers are, in practice, aimed at reaching poorer households and households with children who are the most vulnerable to malnutrition. To explore this issue we estimate the determinants of transfer receipt. The results are presented in table 6. Together with income, we consider household characteristics and province level fixed effects as possible determinants, and introduce a number of controls for geographical variables and characteristics of the head of the household.

Of the household characteristics we would expect that the composition of the household, and in particular the presence of children to whom most of the food programmes are directed, to be an

[34] That these two factors are linked with higher food shares is well established, Deaton 1997, p.254 calls them "two empirical regularities".

important determinant of food transfer receipt. The children variables were entered as proportions to diminish collinearity with the household size variable.[35] We also expect the area of residence to play an important role, as many nutritional programmes are directed to poor rural areas. Finally, given the evidence on the geographic variability of the transfers, and the practice of adopting poverty maps to target different poverty reduction measures we expect the province level fixed effect to be highly significant.[36]

To analyse the determinants of transfer receipt we adopt both a standard probit estimator, as well as the one suggested by Rivers and Vuong (1988), which allows us to take into account the potential error in measurement in income. Income has been instrumented with characteristics related to the productivity (education of the head) and labour market situation of the household head (having a job, whether it is as a dependent or in a family business, being a dual job holder, and the frequency of payment). These instruments proved jointly significant at the 1 percent level (F(6,396)=20.22, Prob>F =0.000) in the instrumenting equation.

Table 6 The determinants of the probability of receiving the transfer

	Probit		Probit River and Vuong	
	Coef *z*	Marg. Eff.♣	Coef *z*	Marg. Eff.♣
Pre transfer income (000)	-0.028** *-7.507*	-0.010	-0.043** *-7.944*	-0.016
Household Size	0.082** *5.329*	0.029	0.093** *5.369*	0.035
Prop. of children <5	2.157** *9.342*	0.772	1.921** *7.906*	0.719
Prop. of children 5-15	1.751** *10.216*	0.627	1.464** *7.709*	0.548
Rural area	0.441** *4.028*	0.158	0.365** *3.193*	0.137
Constant	-3.252** *-8.817*		-2.788** *-6.673*	
Error from the first stage			0.021** 4.220	
N. of obs.	3788		3275	
Joint sign. of regr.	Wald chi2(70)= 29846.02 Prob > chi2= 0.000		Wald chi2(71)= 19583.74 Prob > chi2= 0.000	
Pseudo-R2	0.2503		0.2357	

All equations control for province level fixed effects, as well as departmental variables and household head characteristics (gender, age and age square and ethnicity); robust estimates of the standard error are presented to control for clustering. ♣ Evaluated at the mean of the variables**,** * signific at the 5% level, ** signific at the 1% level

[35] We controlled for characteristics of the head, such as race and gender, in order to test whether they have an independent explanatory power or whether they are just related to the specific geographical distribution of the transfers (living in a rural area, for example, is in itself is very much associated with ethnicity in Peru: the Pearson Chi-squared of association is F(1,390)= 68.0541 P = 0.000). These variables did not appear as significant at the usual significance level.

[36] The choice of the provincial level as the one at which we are testing the existence of fixed effects needs to be explained. Finer partitions of the country could have been adopted: for example, the district level, at which the poverty map on the basis of which the social fund (FONCODES) should allocate funds, is drawn. These alternative variables have the disadvantage that the number of people receiving transfers or even potentially receiving them would be very small, therefore confounding the effect of the distribution of the programmes with the one of individual observations. Rather than adopting province level fixed effects we did try including a dummy specifying whether the district of residence was one identified as prioritarian by the poverty map, but it proved insignificant. This is not surprising, since the map is meant to give only an indication of preferential patterns of expenditure rather than dictate an exclusive criterion (MINPRE 1996, p. 35) and in the light of the plurality of programmes operating in the country.

The results from both sets of estimates are similar, showing that poorer and larger households are more likely to receive food transfers. Further, even if as previously illustrated not all food transfers programmes are directed to children, their presence affects very significantly the probability of receiving a transfer. For example, a household composed of two people sees its probability of receiving a transfer increase from 18% to 35% if they have a child less than five years old, and to 31% if the child is between 5 and 15.[37] The area of residence is also significant. Holding everything else constant, the same couple with a child less than 5 years old had a 16% probability of receiving the transfer in an urban area, and a 25% probability when living in a rural area. In addition, province level fixed effects proved very significant in both specifications,[38] pointing to the uneven distribution of transfers across the territory. Table 6 also confirms the importance of measurement error in income, as shown by the strong rejection of the exogeneity test, in this case the error from the first stage of the Rivers and Vuong procedure, as well as by the attenuation of the coefficient on pre-transfer income in the non instrumented regression.

[37] Simulation based on the Rivers and Vuong estimates, evaluated at the means.

[38] The test of joint significance of the province level fixed effects was chi2(65) =15895.35, Prob> chi2 =0.000 in the non IV probit, chi2(66) =16447.93 Prob > chi2 = 0.000 in the IV probit, F(67, 396) = 1212.37

Table 7 The determinants of the amount transferred

	Least Squares [a]	IV [a]	Heckman		Heckman IV	
			Sample selection equation	*Amount received*	*Sample selection equation*	*Amount received*
	Coef *t*	Coef *t*	Coef *z*	Coef *z*	Coef *z*	Coef *z*
Pre transfer income (000)	-0.007** *-7.249*	-0.021** *-6.036*	-0.0299** *10.776*	-0.8055 *0.216*	-0.033** *-6.696*	10.741 *0.699*
Household Size	56.748** *5.387*	71.495** *5.563*	0.083** *6.534*	43.896** *3.119*	0.092** *6.198*	29.864 *1.275*
Prop. of children <5	1494.182** *10.386*	1328.213** *8.400*	1.991** *10.408*	512.602* *2.446*	1.479** *6.557*	524.521 *1.403*
Prop. of children 5-15	1306.207** *12.024*	1079.604** *8.319*	1.574** *10.802*	451.212* *2.436*	1.184** *6.729*	526.238 *1.574*
Rural area	184.953** *2.652*	113.30 *1.404*	0.451** *8.048*	-553.612** *9.203*	0.391** *6.01*	-482.637** *-3.59*
Constant	-907.533** *-4.117*	-848.11* *-3.132*	-2.262** *3.807*	1,894.641** *11.523*	-1.906** *-5.527*	1928.825** *5.021*
N. of obs.	3841	3340	3841 (1430 positive values)		3340 (1323 positive values)	
Joint sign. of regr.	F(71,396)=357.74 Prob>F=0.0000	F(71,396)=46.79 Prob>F= 0.0000	Wald chi2(14) = 208.91 Prob > chi2 = 0.0000		Wald chi2(14) = 199.99 Prob > chi2 = 0.0000	
Fit	R-squared= 24.64					
Test of indep eq.:			z=-2.91 P>z=0.004		z=-1.954 P>z= .0507	

♠ Controls also for province variables as well as for the gender, age and age square and the ethnicity of the household head. The estimates of the standard error are robust to clust ering. Controls also for department level fixed effects This model accounts fully for measurement error in the second stage of the Heckman procedure. The coefficient of the sample selection equation is predicted but its standard error is not adjusted. * signific at the 5% level, ** signific at the ** level

These same factors whose effect on the probability of receiving a transfer we have just analysed might be operating in different ways in determining the *amount* of transfer received. For example, access to the transfer could be conditional on household structure and other variables, but once admitted to the programmes, *ceteris paribus*, households could be receiving the same amount of transfers. Exploring directly what determines the amount of transfer received might help shed light on the pattern of the distribution of the benefits found in the previous section. The estimation of the determinants of the amount of transfer requires considering that, as illustrated in table 6, receiving food transfers does not depend on random factors. Sample selection might arise as many of the factors which determine a positive receipt are likely to also affect the amount received (as some variables can be expected to affect both participation and the amount of transfer– e.g. the number of children in the household). We consider different ways of ensuring that our estimates are robust to biases due to sample selection problems.

As table 7 shows, we began exploring the issue by following Deaton's (1997) suggestion that ignoring sample selection, and regressing the amount received on the whole sample, without distinguishing between transfer recipients and non recipients and why they are such, can still provide us with useful policy insights on the average effect of the regressors. An advantage of this approach is that it also lends itself to a rather straightforward application of instrumental variables to correct for measurement error. Income was predicted as in table 6, using characteristics of the head. We also estimated a model with sample selection, which gives us an opportunity to test with a Wald test of independent equations for the appropriateness of adopting a Heckman specification versus the alternative of estimating OLS on the sub-sample with positive observations.

In order to estimate a Heckman model, we had to identify variables which could be reasonably included in the selection equation rather than in the main equation, as these exclusion restrictions help in identifying the model even when the assumptions on the joint normality of the error distributions do not hold (Verbeeck 2000). It seems reasonable to assume that characteristics of the head such as age, race and gender, can be safely excluded from the main equation as they should not affect the amount transferred directly, though they might affect the likelihood of being a transfer recipient (e.g. if indigenous people are more likely to live in poor areas where food transfers programmes might be present). Pre-transfer income,[39] household demographics and the geographical variables proxying for the availability of the transfer at the local level, in contrast, are likely also to have an effect on the amount received (e.g. transfers could be higher for poorer people or in poorer areas).[40]

In table 7 we present both sets of estimates in an instrumented and in a non-instrumented form. The comparison of the two sets of estimates is quite interesting. The first two models show that on average income has a negative effect on the amount of transfer received, while household size and proportions of children have on average a positive effect. The results of the Heckman models allow us to unpack this overall effect. We find that income levels negatively affect the probability of receiving transfers (as found already in table 5), but that they do not significantly affect the amount transferred. Similarly, in both our Heckman models, the area of residence plays a double role: while being in the rural areas *increases* the chances of receiving a transfer, it *reduces* the amount of transfers received relative to the urban areas.

This finding confirms the hypothesis of urban bias that we found when looking at the broad geographical disaggregation of the level of transfers.[41] Household composition and size affect not only the probability of receipt but also the amount received in our non-instrumented Heckman model, while they lose significance in the instrumented one, in the levels equation. Finally, it should be noted that the Heckman specification of the model seems quite justified as, with a Wald test of independent equations, we cannot reject the hypothesis that the sample selection and main equation are correlated. This suggests, therefore, that those estimates are to be preferred to a least squares specification.[42]

Summing up, the analysis of the characteristics of the beneficiaries of the transfers confirms some of the elements which had emerged before. Because of the complexity and variety of the system there does not seem to be a single mechanism which determines eligibility (means testing, or a special characteristic of the household members), though the presence of children and household

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[39] The inclusion of an endogenous variable in a Heckman procedure in both stages poses some computational problems. The results presented provide a consistent point estimate for the sample selection equation, but we have not been able to correct the standard error. The *t* statistics on the income coefficient in the selection equation, however, is so high that it seems unlikely that even correcting the standard error would reduce the *t* statistic to the point of making it insignificant at the usual confidence level. Note also how the first stage of the Heckman is equivalent to a probit, and that in the probits in table 6, the coefficient on income was negative and very significant.

[40] Note that, given the strong effect which province level fixed effects have on the probability of being a transfer recipient, we would also like to analyse their role in our analysis of the determinants of the amount received. In the Heckman models, however, we have been unable to include province level fixed effects. As the second stage of the model is run exclusively on the sample for which positive transfers are recorded, the inclusion of the province level fixed effects causes serious problems of convergence in the estimation.

[41] In the linear regression, on the contrary, area of residence is not significant in the instrumented regression. This is possibly due to the high correlation between this variable and predicted income.

[42] At the same time, the fact that some variables were found to have a different effect in the eligibility and the amount received equations suggests against using a tobit specification for this model, as the latter would impose the same coefficient on both equations.

composition seem to be important determinants of the probability of receiving transfers (and possibly of the amount received). As for our other main concern, i.e. whether food transfers are reaching the poorest in terms of income, it seems that low pre-transfer income levels are important determinants of transfer receipt, though, crucially, not of the amount being received. Furthermore, we find evidence of considerable variability in access and amount of transfer relating to the area of residence. These findings seem, therefore, to help explain why the bulk of the benefits of the transfers, as shown in the previous subsections, are not reaching the poor.

5. The impact of food transfers on nutrition

The focus of this section is on assessing the impact of food transfers on nutrition, indirectly by testing whether they are fungible in household budgets or whether they succeed in increasing food consumption, and directly, though for a limited group (i.e. children under 5), by looking at how nutritional outcomes are affected by the transfers.

5.1. The fungibility of food transfers

The key question tackled in this section is whether food transfers succeed in skewing household consumption towards food, or whether they are fungible in household budgets – either because they are inframarginal or because there are trafficking opportunities. The lens we will be using to look at this issue is the one of income labelling (Kooreman 2000, Case and Deaton 1998), as we will not be able to compare directly cash and in-kind transfers. To do so we will compare the marginal propensity to spend on food out of transfers with the marginal propensity to spend of food out of income from other sources. We would expect the result to fall within two extreme cases. On the one hand, equality of the two marginal propensities to consume would imply that the transfer can be fully monetised (either because it is inframarginal or because there are reselling opportunities) and it is therefore treated by the household similarly to other components of income. On the other hand the marginal propensity to consume food out of the transfers could be equal to 1, implying that the food transfer in its entirety is succeeding in increasing food consumption. Intermediate situations are possible, showing that household's behaviour is only partially affected by the transfer. Further, it is possible that the marginal propensity to consume out of food transfers is higher than 1. This could be ascribed either to characteristics of the transfer – for example, an educational element included in some of the food programmes generates further substitutions towards food in terms of quantity or better quality – or of the recipients. We cannot exclude that there is an element of self-selection so that health conscious households are more likely to show a higher marginal propensity to consume food. However plausible this hypothesis might be, it is very hard to find variables which can be used to identify this effect in a sample selection specification.[43]

In table 8 below we present the results obtained when exploring the impact of food transfers on household food consumption. The main econometric problems posed by such analysis relate to the possibility of measurement error in income. Further, we cannot exclude the possibility that measurement error also affects our food transfers variable. Further, it was previously shown that household composition is a good predictor of transfer receipt and amount. This issue is of particular relevance in the context of the analysis of food consumption as the same variables are also likely to affect food consumption *per se*, therefore creating an endogeneity problem. The disentangling of these two effects might therefore pose an econometric challenge.

The first regression in table 8 presents a linear regression of total food expenditure on household total income, controlling for household size and composition. The marginal propensity to consume

[43] Further, as previously discussed, a food-based efficiency wage argument would suggest that food transfers, by increasing income, might have a second round effect in increasing food consumption (Dasgupta 1993).

on food is about 0.08. Regression [2] presents the same equation distinguishing between pre-transfer income and the monetary value of the transfer. Such a disaggregation shows that while the marginal propensity to spend on food out of pre-transfer income is roughly constant at around 0.08, the one out of food transfers is very close to 1 (and indeed statistically not different from 1, F(1,396)=0.25, Prob>F=0.618). In this regression, however, it is possible that household demographic composition variables are partly picking up the effects of food transfer receipt, and that because of that endogeneity the coefficient on food transfers appears attenuated.

Regression [3] tries to address both this endogeneity issue together with the problem of measurement error. Together with variables relating to the labour market behaviour of the head of the household we adopt as instruments fixed effects for provinces, which proved to be important determinants of the amount of food transfers received and which are likely to be uncorrelated with household food expenditure. Keeping in mind that one of the most important sources of food transfers is the school breakfast programme, we also included as instruments the total number of children going to school and the average time children in the household travel to go to school.[44] This variable works well as a predictor, possibly also because it captures remoteness in general. Such specifications passed the over-identification test, showing that there was no need to include any of our instruments in the main regression as well. After the instrumentation, the coefficient on income more than doubles, confirming our suspicions of measurement error (confirmed also by the endogeneity tests). The marginal propensity to consume out of food transfers rises to 1.4, though it is still not statistically different from 1 at the 5% level (F(1,396)=6.52, Prob>F=0.011). The hypothesis of equality between the two coefficients was rejected (F(1,396)=64.77, Prob>F=0.000). On average, therefore food transfers appear not to be fungible in household budgets.

When running these regressions our main interest is in comparing the two marginal propensities to consume in order to test for income labelling. It seems obvious, however, when reading across regressions [1]-[3], that our models are not doing a great job at identifying precisely the effects of household composition on the demand for food. We have therefore sought a more radical approach to separate the effects of children on transfer receipt from their effects on food consumption. A simple way of doing so is to neutralise this last effect by transforming the model in terms of adult equivalents, so that the number of children does not any longer drive household expenditure on food. This way of proceeding also allow us to use the presence of children themselves as instruments for transfers receipt. We have, therefore, repeated the estimation of model [3] adopting different types of equivalence scales in model [4] and [5].[45] Once again we found that the pre-transfer income coefficient, and the food transfer coefficient differ with F tests respectively of F(1,396)=91.91, Prob>F= 0.000 and F(1,396)=50.48, Prob>F=0.000.

Finally, model [6] presents another possible specification of the model. This semilog specification (Moffitt 1989, Case and Deaton 1998) allows for an indirect test of the presence of income labelling by testing whether the share of food transfers in total income affects food expenditure. In estimating this model we have again adopted Glewwe's scales to exploit the predictive power of the children variables in the instrumenting regressions. Once again we find that receiving the transfers or not makes a difference to household expenditure patterns. Further, we have a confirmation of the robustness of the results in the previous model, as we can show that the difference in marginal propensity to consume is not only a by-product of the specific functional form adopted.

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[44] As this variable was missing for households who do not have children going to school, we set the missing values to zero and introduced a dummy equal to 1 when the variable was not observed and zero otherwise (Maddala 1977, Green 1993)

[45] In regression [4] we adopted the scales used by Glewwe (1988), while in regression [5] we adopted a constant elasticity scale with θ set equal to 0.515, as derived in Ruggeri Laderchi (2001).

The finding that transfers are not fungible and that they succeed in increasing food consumption seems, therefore, strongly supported by our data. Of the specifications presented, model [4] and [5] are preferable, as they allow us to isolate the effect of the children variables on food expenditure through food transfer receipt. In both models, and especially in model [4],[46] the marginal propensity to consume out of food transfers is very high, suggesting that transfers are marginal and as such constrain individual choices. We cannot ascertain, however, whether some of the specific features of the transfers (e.g. related to the control of household resources, or the programmes' educational components, or the rationing which households might experience in certain markets) influence this result. Further, we cannot test for self-selection, a further effect relating to the characteristics of the beneficiaries.

[46]As discussed in Ruggeri Laderchi (2001) the scales adopted for model [5] are Engel scales, while the ones that Glewwe (1988) uses are "consistent with those estimated for Sri Lanka and Indonesia by Deaton and Muellbauer (1986)" (p6), estimated using Rothbarth's procedure which represents a more "sensible starting point for cost [of children] measurement" than Engel curves (Deaton and Muellbauer 1986, p 720).

Table 8 Total food expenditure and the impact of transfers

	Reg [1] No IV	Reg [2] No IV	Reg [3] IV	Reg [4] IV -- Glewwe	Reg [5] IV -- theta scale	Reg [6] semilog specific with IV	
	Coef.	Coef.	Coef.	Coef.	Coef.		Coef.
	t	*t*	*t*	*t*	*t*		*t*
Total income	0.075**					**Log total income**	2183.330**
	10.703						*9.682*
Pre transfer income		0.079**	0.203**	0.195**	0.191**	**Transfer share in total income**	5398.751**
		10.921	*11.336*	*9.493*	*10.44*		*15.47*
Value of food transfers		0.981**	1.386**	1.396**	1.222**		
		25.253	*9.164*	*10.848*	*8.028*		
Household Size	250.760**	202.448**	33.045				
	9.784	*8.361*	*0.82*				
Prop. of children <5	284.541	-1095.537**	-144.786				
	0.842	*-3.338*	*-0.277*				
Prop of children 5-15	614.734*	-570.331*	818.811				
	2.329	*-2.197*	*1.94*				
Constant	3213.684**	3715.861**	2103.651**	826.780**	879.297**	**Constant**	-16712.840**
	5.777	*7.449*	*2.763*	*3.449*	*2.933*		*-8.171*
Obs.	3836	3836	3335	3335	3335	3327	
Joint significance	F(32,396)=19.84 Prob>F=0.000	F(33,396)=58.76 Prob>F=0.000	F(33,396)=18.370 Prob>F=0.000	F(30,396)=33.43 Prob>F=0.000	F(30,396)=11.83 Prob>F=0.000	F(30, 396)= 79.29	
Endogeneity test			Pre-transfer inc.: t=-8.479, Food transfers: t=-3.218	Pre-transfer inc.: t=-8.101 Food transfers: t=-2.954	Pre-transfer inc.: t=-8.769 Food transfers: t=-2.011	Pre-transfer inc.: t=-4.878 Food transfers: t=18.150	
OID test			Chi(88)= 100.152 P>Chi=0.177	Chi(90)= 98.099 P>Chi=0.263	Chi(90)= 107.074 P>Chi=0.106	Chi(90)= 96.244 P>Chi=0.307	

These estimates are obtained with a robust estimator to account for the clustered nature of the data. All estimates control for some characteristics of the head (gender, education, indigenous race, age and its square as well as location department, area and locality). The instrumenting equation in reg. [3] uses labour market variables (whether the head works, works as a dependent, is a dual job holder, the frequency of payment (daily, weekly)) and provincial level fixed effects as well as all the other exogenous variables in the model to predict income and food transfer; * signific at the 5% level, ** signific at the ** level

5.2. Transfers and child nutritional status

In this section we are going to test directly for the nutritional impact of food transfers. The finding that households are not offsetting the effects of food transfers by their behaviour is, in fact, a rather indirect measure of their impact on household members' nutritional status. Looking at aggregate food expenditure does not allow us to observe possible inter-item reallocations (we are not able, in fact, to control whether higher expenditure is translated into higher quality and higher price nutrients or rather in an increase of nutrients available, Strauss and Thomas 1993). Further, given the heterogeneous nature of the food transfers schemes we are considering, and the fact that they are not necessarily targeted to specific household members, we cannot infer from such a finding that the effective intra-household distribution of the benefit is such as to benefit those at higher nutritional risk. While these considerations point to the need of testing directly for the nutritional impact of the transfers for different groups of individuals, on the basis of the data available to us, this is possible only for the children 0-5 years old.

In order to test for the nutritional impact of food transfers on children anthropometric status we resort to the estimation of quasi-reduced form equations (e.g. Kennedy and Haddad 1994). The determinants we consider, apart from transfers and other sources of income, include child, parental and household characteristics, together with community factors and household availability of publicly provided goods and services. The estimation of these models entails dealing with a number of econometric problems. First of all, household resources and child health outcomes might be jointly determined, for example by decisions taken over the household (and especially maternal) allocation of time between work and care.[47] Further, previous sections have shown the potential effects of measurement error on our estimates.

Another major complication arises from the potential endogeneity of the placement of the programmes, an issue first discussed in Rosenzweig and Wolpin (1986). They pointed out that in the Indonesian case, as the spatial distribution of programmes reflected some characteristic of the areas where the programmes were placed, cross-sectional estimates of the effects of the programmes were biased. This explained the negative effect that they found between health programmes and child health, a reflection of programmes having been placed in particularly unhealthy areas. In our case, however, aside from the endogenous placement issue, community-specific unobservables have also a bearing on children nutritional achievements. Therefore, even if unobservable community specific factors (e.g. quality of water supply, or prevalence of parasitic diseases; or other factors of a different nature such as electoral patterns – Shady 2000) were not potentially responsible for the placement of the programme, it might be reasonable to include district level fixed effects in the regressions. Their inclusion, therefore, fulfils two (not necessarily overlapping) roles: controlling for local features which affect malnutrition, and controlling for local features which might have affected the placement.

While the inclusion of community specific fixed effects to control for programme placement seems to be inescapable if the effect of the programme is to be identified, in our regressions it is not a panacea. A first complication arises as even community fixed effects might not solve the issue of identifying the effect of the transfer, if all the individuals in a given community appear to be receiving them.[48] In this case, in fact, the fixed effect for that community "washes out" the effect of the transfer. In our data set 12% of the 247 districts in which children for which we have

[47] This issue is clearly brought out by studies which take a broader approach and incorporate qualitative analysis (e.g. Ruel et al. 1999)

[48] That this might happen is not unlikely as the survey we are using is not representative at the district level.

anthropometric measurements live are in this situation, and many more have high level of receipt, which might have consequences for our estimation procedure.

The second complication arises in the instrumentation of transfers to account for measurement error. Previously we used geographic fixed effects to predict the transfer level when adopting instrumental variables. This will not be possible here as we need the geographic fixed effects in the main regression to control for local level unobservables which might affect child nutritional outcomes. We are therefore left without a good set of instruments for the transfer level. To obviate to this problem, a solution analogous to the one offered by Ravallion and Wodon (2000) will be tried. They, in fact, include community effects when estimating the impact of a food transfer programme conditional on children attending school in Bangladesh, by exploiting the two-staged nature of the targeting process. Villages are first selected on the basis of observable characteristics, and then households within the village are selected on the basis of idiosyncratic indicators determined at the local level. These features of the targeting process allow the authors to use village level participation, for which they have community data, as an instrument for individual participation, while including in the main regression fixed effects at the village level.

Table 9 below presents the results of our analysis. In all these models we adopted a semilog specification of the standard score of child height for age on total household income and the share of transfers.[49] The advantage offered by this specification is that it allows us to test for two separate effects of transfers: one through a general income effect, the other through its specific nature as in-kind transfer. In the light of our finding that food transfers succeed in increasing food consumption, an independent effect of the transfers share would point to the transfer being "earmarked" for the child – this would have a positive effect on child growth either as the transfer skews the allocation of food towards the child or because of the higher nutritional content of the transfer itself when compared to the rest of the food.

Other regressors considered include child specific characteristics (gender and age), household variables (size and the percentage of children under 5, as well as the ethnicity of the head and residence in a rural area), maternal age and education variables, household access to public water and sewage, and a dummy for rural areas. We have also included various interactions of the dummy for access to public water with the age of the child, as children's vulnerability to water quality might vary with age, as well as with transfer receipt. This variable was of particular interest as some food programmes (like the glass of milk) involve the distribution of powdered milk, whose health effects greatly depend on the quality of the water used to dilute it. Finally, in all models except model [1] we include a set of district level fixed effects.

Model [1] is a linear regression of children's height for age standard score on these regressors and shows that the positive effect that transfers exert on child malnutrition is limited to their income effect – the income coefficient is highly significant while the share of transfers in income is not. In model [2] we added to the basic specification district specific fixed effects to control for possible endogenous placement. The coefficient on the share of transfers in household income, however, remains insignificant. This we might take to mean either that transfers have really no additional effect, or that not even by including district level fixed effects are we able to identify their effects, an issue to which we will come back later.

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[49] The alternative of a linear model could not be proved to be superior with a non-nested test, with both the residual of the log regression proving significantly different from zero in the linear model (*t*: 151.66) and the error from the linear regression being significantly different from zero in the log model (*t*: 202.85). Further, as for the subset of our total sample composed by children under 5 for which anthropometric measures were recorded the income variable appears strongly skewed, so the semilog specification seemed appropriate (Mukherjee, White and Wuyts 1998)

In model [3] and [4] we tackle the problems of error in measurement. We instrumented income with household assets and durables and our specification passed both the overidentification and the exogeneity test (the joint significance of the regressors in the instrumenting equation was F(269, 2094)= 17.19, Prob>F=0.000).[50] As expected, adopting instrumental variables the size of the coefficient on income greatly increases. In model [4] we present estimates obtained when instrumenting both income and transfers. As shown by the last rows in table 9, however, when instrumenting transfers we could not reject the null of exogeneity at the usual 5% level. The interest of that regression lies in that we followed a procedure similar to the one adopted by Ravallion and Wodon (2000; i.e. we used as an instrument whether the district was a priority one according to the Ministry of the Presidency poverty map). The fact that, once more, the poverty map appears as a bad predictor of transfers shows that at least some of the transfers programmes we are considering are not targeted following the guidelines issued by the Ministry of the Presidency. As no other plausible instrument could be identified, we have not attempted to instrument transfers any further, though of course we are aware of the potential attenuation bias in the coefficient on transfers.[51]

The results in table 9 are in line with other findings in the literature (Ruggeri Laderchi 1999). Household per capita income significantly affects child height-for-age standard score, and the effects increases after correcting for measurement error. Similarly, it is not surprising in the Peruvian context that age, but not gender, affect long term nutritional outcomes. Of the household variables, belonging to rural and larger households as well as higher percentages of children adversely affect nutritional outcomes, while maternal education improves them. Having access to public water appears to have different effects for children of different ages, but overall it is negative[52] for children older than 1 (being 0-1 is the omitted dummy taken as a benchmark).

The variable in which we are mostly interested in, i.e. the share of household income received through the transfers, appears insignificant in all the models presented in table 9. Such a lack of independent effect would suggest that the scepticism with which nutritionists consider food transfers in Peru is well-founded: accessing food access, even if successful as in this case (food transfers are increasing food consumption) does not remove the constraints which prevent people from achieving better nutrition other than through its income effect. It seems however worth probing further this finding.

[50] This way of instrumenting income does not necessarily capture the potential simultaneous determination of child health and household income via the labour market allocation- care link. It is not clear, however, how one would tackle empirically this issue especially in terms of finding instruments.

[51] Note that, unlike the case of the Engel curves previously shown, it would not seem appropriate to adopt household composition variables as instruments. In this context, in fact, household composition, and in particular the proportion of children present in the household, affects the outcome of interest not only by affecting household food needs, but also through the amount of care available to children.

[52] It appears as significant and positive for children aged 1-2 not receiving the transfer but only in equation [1], and for children 4-5 in equation [2].

Table 9 The impact of transfers on children height for age standard score – district effects

	Reg [1] no district effect	Reg [2] with district effect	Reg [3] IV income and d.e.	Reg[4] IV both and d.e.
	Coef. *t*	Coef. *t*	Coef. *t*	Coef. *t*
Log total income	0.237**	0.215**	0.636**	0.710**
	5.283	*4.018*	*4.565*	*4.187*
Transfer share	-0.202	-0.063	0.255	2.676
in total income	*0.893*	*0.245*	*0.918*	*0.895*
Water & transfer	-0.619*	-0.385	-0.369	-2.577
	2.051	*1.123*	*1.060*	*0.941*
Gender	-0.001	0.008	-0.003	-0.025
	0.024	*0.139*	*0.062*	*0.395*
Age in months	-0.029**	-0.029**	-0.030**	-0.031**
	11.887	*12.111*	*11.956*	*10.559*
Water & being 1 -2	-0.311*	-0.290	-0.305	-0.346*
	2.025	*1.878*	*1.943*	*2.043*
Water & being 2 -3	-0.931**	-0.906**	-0.908**	-0.954**
	7.005	*6.684*	*6.587*	*6.242*
Water & being 3 -4	-0.465**	-0.504**	-0.504**	-0.537**
	4.077	*4.365*	*4.293*	*4.215*
Wate r & being 4 -5	-0.200	-0.287**	-0.311**	-0.322**
	1.943	*2.739*	*2.908*	*2.907*
Prop. of children <5	-1.085**	-0.970**	-0.809**	-0.900**
	4.800	*3.946*	*3.169*	*3.152*
Household Size	-0.066**	-0.072**	-0.103**	-0.114**
	5.261	*5.274*	*6.162*	*5.177*
Mother with primary sch.	0.349**	0.276**	0.199**	0.212**
	5.396	*3.890*	*2.606*	*2.646*
Mother age	-0.008	-0.021	-0.014	-0.025
	0.550	*1.348*	*0.896*	*1.188*
Mother age sq.	0.000	0.000	0.000	0.000
	0.930	*1.521*	*1.022*	*1.279*
Access to public water	0.473**	0.434**	0.349*	0.652
	3.989	*2.953*	*2.302*	*1.613*
Access to public sewage	0.208*	0.126	0.077	0.042
	2.525	*1.172*	*0.700*	*0.345*
Rural area	-0.183*	-0.130	-0.027	-0.100
	2.235	*0.884*	*0.179*	*0.556*
Race of the head	-0.301**	-0.122	-0.134	-0.204
	4.566	*1.194*	*1.292*	*1.488*
Constant	-1.733**	-1.893	-5.232**	-5.944**
	3.404	*1.486*	*3.176*	*2.665*
Observations	2058	2058	2057	2057
R-squared	0.273	0.414	0.394	0.358
OID			Chi(8)= 7.786 P>Chi= 0.455	Chi(8)= 6.357 P>Chi=0.607
Exogeneity			Inc. t: -3.28	Inc. t: -3.32 Trans.t:-1.07

Absolute value of t statistics in italics, * significant at 5%; ** significant at 1%

In order to further investigate the lack of independent impact of food transfers on nutritional outcomes emerging from table 9, alternative hypothesis have been considered. One possible explanation for the lack of an independent additional effect of food transfers on nutrition, other than as an income component, is that by focusing on young children we are not capturing some specific nutritional benefit accruing to others in the household. Due to the lack of information on the nutritional status of other groups of individuals we cannot however test this claim. Another potential explanation might be that the results presented in table 9 do not fully control for heterogeneity in the characteristics of the programmes or of the beneficiaries. It seems plausible, for

example, that young children who do not attend school do not benefit from the school breakfast programme directly, though they might benefit indirectly if food eaten at home is reallocated away from older children who benefit from the transfer.[53] Further, it is possible that data availability is pushing us to focus on an indicator which, as it captures many wider influences on child health and nutritional status (such as, for example, alternative nurturing practices), is not very responsive to small increases in food intake.

In the following tables we explore these different alternatives in order to disentangle these possible explanations from the one that food transfers have no independent effect on indicators of long term malnutrition in the under 5 other than through their income effect. In table 10 we started by replicating equations [1]-[3] from table 9, this time disaggregating the effect of food transfer by programme. We have considered two different ways of doing so. In models [1]-[3] we have considered the overall share of transfers in household income introducing dummies to control for the type of programme received.[54] In models [4]-[6] we introduced separately the income share of each of these programmes. In all these models we find again a strong and significant effect of income in decreasing stunting. When looking at the independent impact of different programmes we find however that they are quite heterogeneous.

[53] Jacoby (1997) explicitly tests for a "fly-paper" effect by which school breakfast benefits in terms of calorie "stick" to the child who has received them, and finds that by and large they do, though some reallocation occurs more markedly for poor households. Chinen and Cueto (2000), in their study of the benefits from the school breakfast in the rural Sierra areas in Peru do not deal address the question explicitly but present findings which give us some clue. Parents are reported as giving breakfast to children before they go to school as they often have to walk long distances to go to school.

[54] Note that we control only for the four major programmes as we have very few observations for the other programmes.

Table 10 The impact of transfers on children height for age standard score – district effects and programme variables

	reg [1] dummy progr. no d. e.	reg [2] dummy progr. with d. e.	reg [3] dummy progr., IV inc. and d.e.	reg [4] income share by progr., no district effect	reg [5] income share by progr., with d. e.	reg [6] income share by progr., IV income and d.e.
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
	t	*t*	*t*	*t*	*t*	*t*
Log total income	0.257**	0.238**	0.637**	0.203**	0.201**	0.695**
	5.675	*4.380*	*4.623*	*4.442*	*3.580*	*4.572*
Transfer share in tot. inc.	0.104	0.174	0.579			
	0.420	*0.629*	*1.883*			
School breakfast	-0.161*	-0.188*	-0.269**	-0.802**	-0.682*	-0.279
	2.374	*2.354*	*3.163*	*3.346*	*2.496*	*0.925*
Glass of milk	-0.157*	-0.073	-0.116	-0.485*	0.017	0.709*
	2.355	*0.966*	*1.491*	*2.157*	*0.065*	*2.153*
Communal kitchen	0.150	-0.037	-0.026	0.895	-0.067	-0.028
	1.302	*0.273*	*0.188*	*0.839*	*0.057*	*0.023*
Mothers' club	0.059	0.148	0.206	2.514**	3.036**	3.278**
	0.460	*1.032*	*1.398*	*3.837*	*4.426*	*4.657*
Water & transfer	-0.493	-0.247	-0.172	-0.611*	-0.346	-0.257
	1.603	*0.706*	*0.482*	*2.572*	*1.315*	*0.952*
Gender	-0.002	0.008	-0.001	-0.000	0.007	-0.005
	0.030	*0.152*	*0.024*	*0.006*	*0.126*	*0.093*
Age in months	-0.028**	-0.029**	-0.029**	-0.028**	-0.029**	-0.030**
	11.601	*11.914*	*11.705*	*11.754*	*12.068*	*12.018*
Water & being 1	-0.290	-0.281	-0.291	-0.322*	-0.320*	-0.352*
	1.888	*1.822*	*1.855*	*2.104*	*2.084*	*2.239*
Water & being 2	-0.918**	-0.899**	-0.897**	-0.932**	-0.910**	-0.920**
	6.912	*6.633*	*6.521*	*7.053*	*6.761*	*6.690*
Water & being 3	-0.455**	-0.502**	-0.500**	-0.451**	-0.496**	-0.508**
	3.996	*4.346*	*4.267*	*3.971*	*4.320*	*4.324*
Water & being 4	-0.195	-0.278**	-0.296**	-0.192	-0.276**	-0.306**
	1.898	*2.654*	*2.778*	*1.878*	*2.649*	*2.866*
Prop. of children <5	-1.090**	-0.997**	-0.859**	-1.087**	-0.993**	-0.815**
	4.812	*4.037*	*3.375*	*4.830*	*4.047*	*3.183*
Household Size	-0.062**	-0.069**	-0.095**	-0.062**	-0.070**	-0.107**
	4.868	*4.952*	*5.838*	*4.968*	*5.087*	*6.116*
Mother with primary schooling	0.346**	0.266**	0.190*	0.344**	0.271**	0.190*
	5.357	*3.736*	*2.485*	*5.361*	*3.837*	*2.493*
Mother age	-0.005	-0.019	-0.012	-0.007	-0.020	-0.013
	0.352	*1.245*	*0.779*	*0.465*	*1.300*	*0.809*
Mother age sq.	0.000	0.000	0.000	0.000	0.000	0.000
	0.746	*1.435*	*0.933*	*0.856*	*1.457*	*0.898*
Access to public water	0.445**	0.416**	0.328*	0.459**	0.438**	0.329*
	3.738	*2.825*	*2.164*	*4.030*	*3.064*	*2.205*
Access to public sewage	0.206*	0.101	0.046	0.204*	0.099	0.045
	2.500	*0.936*	*0.416*	*2.500*	*0.926*	*0.410*
Rural area	-0.149	-0.149	-0.058	-0.163*	-0.152	-0.083
	1.794	*1.000*	*0.378*	*1.996*	*1.030*	*0.545*
Race of the head	-0.271**	-0.122	-0.133	-0.266**	-0.110	-0.133
	4.060	*1.201*	*1.290*	*4.019*	*1.089*	*1.281*
Constant	-1.959**	-2.133	-5.343**	-1.432**	-1.551	-5.773**
	3.815	*1.664*	*3.237*	*2.784*	*1.217*	*2.808*
Observations	2058	2058	2057	2058	2058	2057
R-squared	0.277	0.416	0.399	0.283	0.423	0.398
OID			Chi(8)=8.192 P>Chi=0.415			Chi(8)= 8.076 P>Chi=.426
Exogeneity			Income. t: -3.19			Income: t: -3.53

Absolute value of t statistics in italics, * significant at 5%; ** significant at 1%; d.e: district effect

In models [1]-[3] the overall transfer share appears again as positive and insignificant, while a strong negative effect of the "household receiving the school breakfast programme" dummy is the only significant programme-specific effect emerging. This particular result is hard to interpret as this transfer is directed to older children. Further, it should not have a direct negative effect on children under 5, unless in households where children go to school and receive the school breakfast there is also an active discrimination against younger children. It seems more likely, therefore, that these regressions are capturing some other unobserved mechanism at work, which is contaminating

our programme receipt variable. A possible explanation could, for example, be that households with malnourished children are more eager to send their children to school in order to benefit from the school breakfast.[55] The circumstance that this particular programme is not causing harm to young children seems confirmed when looking at model [6]. Once correcting for measurement error in income, in fact, the share of income received through this programme becomes insignificant. At the same time in regression [6] we find that both the share of transfer received via the "glass of milk" programme and via communal kitchens (two programmes which are distributed to mothers and, therefore, stand a better chance to directly benefit young children) have a positive and significant effect on child height-for-age standard score.

Finally, in table 11 we have restricted our analysis to children in the sample who live in households were there are other children under 5. This has allowed us to estimate a household specific fixed effect model, with the aim of controlling for household specific characteristics (such as health attitudes, nurturing practices, decision making on transfer allocations) which might have a bearing on the effectiveness of the transfers. The consideration of this model implies that we can only include child specific variables as any other household specific feature is captured by the fixed effect. In order to analyse the importance of income and transfers, therefore, we interacted their specific effect with different age dummies. For these two variables, therefore, we can only consider their relative effectiveness with respect to the reference group 0-1.

As shown in figure 11 we find that income in general has a negative age-specific effect at age 1-2, compared to the group of 0-1. One possible explanation for this result is that income is less effective in the post-weaning period as at that age nutritional risks are higher, though ascertaining this would require more specific analysis. With this exception, however, the effectiveness of income in producing child nutritional achievements does not seem to vary for the age group considered. When considering the transfer shares, however, we find that transfers have an additional positive and significant (at the 10% level as the probability level is 0.057) independent effect on children aged 3-4. This finding seems consistent with the idea that it is before age 3 that the height for age z score is most strongly affected (and as we are considering transfers over a year we are capturing effects of an intervention before age 3), and as one would expect that extremely young children who are not yet weaned would not benefit from the transfer.

[55] Cueto and Chinen's (2000) find evidence which supports this hypothesis. They find in fact that schools in which the school breakfast is provided are more likely to have bilingual children (i.e. children of indigenous speaking households) and poorer children and suggest that the transfer provides a strong incentive to for parents of more disadvantaged children to keep their children in school. A further mechanism behind the negative effect of the school breakfast programme could be some form of informal targeting taking place by the school personnel towards children from more malnourished households.

Table 11 The impact of transfers on children height for age standard score – household level fixed effects and income share by programme

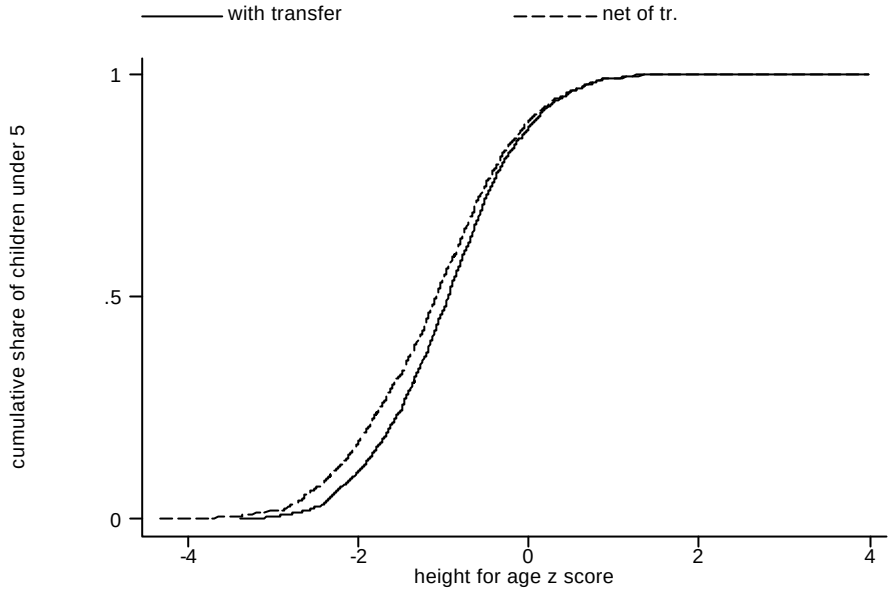
	Coef. *t*
Gender	0.032
	0.35
Age in months	-0.040**
	-5.3
Log total income & age 1-2	-0.041** *-2.19*
Transfer share in total income & age 1-2	0.129 *0.18*
Log total income & age 2-3	0.030 *1.37*
Transfer share in total income & age 2-3	-0.602 *-1.02*
Log total income & age 3-4	0.028 *0.97* ,
Transfer share in total income & age 3-4	1.300 *1.91*
Log total income & age 4-5	0.085* *2.18*
Transfer share in total income & age 4-5	0.081 *0.13*
Observations	911
Significance	F(501,409)=2.41 P>F=0.000
Adj R-squared	0.4376

Absolute value of t statistics in italics, significant at the 10% level, * significant at 5%; ** significant at 1%

Table 10 and 11 provide a useful complement to the assessment of food transfers performed in table 9. Overall, food transfers – even if succeeding in improving food consumption – are contributing to improved child nutrition as much as any other addition to household income. Such a result needs to be qualified, however, by considering that some food transfers programme do have an independent additional effect on child nutrition, and that the relative effectiveness of food transfers in improving long term nutritional status varies with the age of the child.

Figure 5 below gives an idea of the size of the effect of transfers on nutrition by plotting the cumulative distribution of the predicted height for age z score with and without food transfers (results from model [6] in table 10). The "with transfer" distribution clearly dominates the "without transfer" one over the relevant range (i.e. for values of less than –2 in the height for age z-score). We have found, however, that this effect is mostly driven by their income effect. This seems to represent a lost opportunity, as this type of transfers could be designed in such a way as to have further positive additional effects on the nutritional status of the under 5 (as shown by the fact that some transfers succeed in doing so). Further, figure 1 shows that much of the benefit in terms of improved height for age standard score is captured by children who would be above the commonly used malnutrition standard even without the transfer.

Figure 4 The direct impact of food transfers on the distribution of the height for age z score



Our overall assessment, therefore, is that food transfers are contributing to reduced child malnutrition, though our results raise important issues on the types of programmes which are currently implemented, and call for a reconsideration of the modality of distribution– possibly cutting back on those programmes which do not appear to significantly improve child nutrition (or the nutrition of other vulnerable groups). It seems in fact that more could be done to boost the transfers' nutritional effectiveness by finding more effective ways of reaching malnourished children, by understanding better the interactions between child development and characteristics of the programmes, as well as by building on the features which characterise programmes with an additional positive impact, beyond that through increased income. These results need to be qualified, however, by considering that food transfers might also have other indirect effects on nutrition. These other channels of impact, not all necessarily working in the same direction, will be analysed in the next sections, with particular reference to the labour market behaviour of transfer recipients.

6. The impact of food transfers on monetary poverty

In section 1.2. above we introduced the issue of the possible endogeneity of household constraints as one which affects the poverty alleviation potential of in-kind transfers, at least from a monetary perspective. In this section we will analyse this issue with respect to the impact of food transfers on labour market behaviour, by testing whether transfer programme affect the choice between labour and leisure. It should be noted that this analysis tests for the sign and size of second round effects of food transfers on monetary poverty, beyond the ones they have by being a source of income themselves. In other words, we are testing here whether the endogenous changes in labour market behaviour caused by the transfers reinforce or weaken the "income transfer element" implicit in the transfer.

6.1. Food transfers and the labour market

An analysis similar to this one has been performed by Cortez (1999), explicitly considering the impact of various programmes (food transfers and child care) on female labour market behaviour in Peru. One of the findings of his analysis is that the apparent regressivity of the transfers does not hold to careful scrutiny. Because of the complementarities between transfers and working decisions, transfers mobilise greater participation of women in the labour market, hence contributing to an

increase in household resources greater than the value of the transfer provided. In this light, therefore, the transfers appear generally targeted to the poorest, though considering the ex-post income distribution would show a more regressive picture. As already mentioned, however, Cortez (1999) conflates the effects of different programmes which might result in different impacts on female labour market behaviour, as well as not considering the impact on male labour market behaviour.

The estimation of these kind of labour market models entails analysing both the decision to work and the number of hours (or days) worked, as transfers cannot be assumed to have the same impact on both. A useful framework for looking at this issue is offered by Sahn and Alderman (1995), who evaluate the labour market impact of rice subsidies in Sri Lanka:

[1] probability of labour force participation = $1-F(-\boldsymbol{b}\boldsymbol{x}_{1i})$

and

[2] $H_i^s = h(x_{2i}, t_i^*, \boldsymbol{l}_i)$ conditional on $h_i > 0$

where H_i^s is the number of hours worked by individual i in sector s, x_{2i} is a set of variables explaining labour supply (among which is the wage, predicted controlling for sample selection with a Heckman procedure), t^* is the amount of transfer the individual receives and $\boldsymbol{l}_i$ is the inverse Mills ratio derived from the estimation of the participation equation in [1] in order to correct for sample selection. In order to control for the simultaneity of labour and subsidy choices Sahn and Alderman (1995) estimate their model instrumenting t^*.

This estimation strategy is not without problems,[56] the most obvious of which is the need to find plausible exclusion restrictions to identify the Heckman model when estimating the hours worked equation.[57] And if the data reject the sample selection specification adopted, equation [2] becomes one that can simply be estimated by ordinary least squares, or alternatively by instrumental variables if one is correcting for simultaneity. This model allows us to isolate the effects of a food transfer receipt on the decision to work and on the number of days worked.[58]

6.1.1. Food transfers and participation in the labour market

Having resolved to adopt a strategy analogous to the one adopted by Sahn and Alderman (1995), we started our analysis of the labour market with a Heckman procedure in order to impute a wage for the entire population of working age. We estimated separate models for men and women, as well as for urban and rural areas, in order to take into account gender specific determinants of participation as well as the possible segmentation of the labour market. The results on the basis of which we predicted the wages are reported in Appendix 2. We then proceeded to the estimation of the participation and labour supply equations for the same four groups of people identified above.

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[56] One simplification which they adopt is to estimate [2] without considering kinks in the budget constraint (caused both by the transfer and the tax system), due from either marginal effects of the transfer or the effects of progressive income taxes.

[57] The issue of identifying exclusion restrictions is less of a problem when considering wage equations. Starting with Gronau (1974) seminal paper on women's wages household demographic characteristics, and in particular the presence of children, have been considered as suitable variables to include in the first stage of the Heckman procedure but to exclude from wage equations.

[58] Cortez (1999) adopts instead a more unusual procedure. He runs a tobit model of the hours worked by women, including among the regressors both the predicted wage and the Mills ratio from a Heckman model. This strategy offers the advantage of simplifying the task of simulating an income distribution, as the results consist of only one set of coefficients (in contrast, Sahn and Alderman (1995) run separate simulations for the effect of transfers on each of the equations, and discuss only the effects of transfers on the days worked as they are quantitatively more important) At the same time, by running a tobit, Cortez's (1999) model forces the same coefficients on both participation and hours supply regressions.

As mentioned, Sahn and Alderman (1995) estimate these equations jointly, again through a Heckman procedure. Unlike the case of wages, however, such a way of proceeding is not as straightforward, as no obvious variables suggest themselves as determinants of the decision to work while at the same time not influencing the amount of hours an individual decides to work. Several interaction terms between variables included in the main equations have been tried as possible identifying restrictions the model, but the Wald test rejected all the specifications. The participation and the hours worked equation have therefore been estimated separately. In estimating both models our main concerns have been with testing the effects of transfers, examining the robustness of our findings to different specifications, as well as trying to obtain as maximising the fit to improve the reliability of our simulations. We did not adopt, therefore, a fixed set of regressors in all models. Due to the possible endogeneity of labour market behaviour and transfer receipt, which, as we already discussed, can depend on household demographic composition,[59] in our estimates we instrumented transfers and tested for the appropriateness of such specifications.

As shown by table 12, transfers seem to affect significantly only female decisions to participate in the labour market. This effect is strong in the case of urban women, while for rural women the coefficient on transfers is significant at the 8% level in the instrumental variable regression. Note, however, how for all the groups, even after controlling for endogeneity, transfers seem to have a positive effect on participation. It is interesting to contrast this positive effect of transfers with the negative effect that other sources of non earned income have on participation in urban areas. It seems plausible that the time saving characteristic of food transfers, especially if distributed through communal kitchens (which tend to be concentrated in urban areas), might explain this peculiar effect.

Another interesting characteristic of the equation for urban women is that it is the only one for which the IV specification – obtained with the Rivers and Vuong procedure already illustrated and using province level fixed effects as instruments – allows us to reject the hypothesis of exogeneity. Following the instrumentation, as expected, the coefficient on transfers increases more than sevenfold. Again, in the rural women model the endogeneity test would be passed at the 7% level, which implies a rejection of endogeneity which is not so strong as to discard completely the informational value of this model.[60]

[59] Sahn and Alderman (1995) suggests that it might also be related to unobserved heterogeneity.

[60] In this, as for the men equations it seems hard to improve the specification of our IV regressions due to the difficulties of identifying good instruments for food transfers, as the presence of children can hardly be taken a priori as having no effect on participation decisions.

Table 12 Participation in the work out of the house

	Urban areas				Rural areas			
	Men	**Men IV**	**Women**	**Women IV**	**Men**	**Men IV**	**Women**	**Women IV**
	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*
Transfers (000)	0.0136 *0.169*	0.0549 *0.379*	0.0858** *2.628*	0.2337** *2.662*	0.0268 *0.391*	0.024 *0.176*	0.0316 *0.771*	0.1693 *1.749*
Log wage	2.080* *2.203*	2.063* *2.182*	-0.974 *-1.564*	-0.820 *-1.313*	0.134 *0.138*	0.133 *0.137*	-2.118* *-2.070*	-1.872 *-1.788*
Log wage sq.	-1.175 *-1.836*	-1.157 *-1.812*	1.472* *2.259*	1.368* *2.100*	-0.237 *-0.315*	-0.237 *-0.315*	1.109 *1.424*	1.022 *.296*
Log wage * age	-0.013 *-1.559*	-0.013 *-1.568*	0.011 *1.002*	0.009 *0.824*			0.042 *1.600*	0.040 *1.470*
Age	0.189** *3.551*	0.188** *3.550*	0.148** *5.932*	0.141** *5.579*	0.162** *3.971*	0.162** *3.983*	0.130** *9.026*	0.131** *9.077*
Age Squared	-0.002** *-3.888*	-0.002** *-3.890*	-0.002** *-5.957*	-0.002** *-5.613*	-0.002** *-4.220*	-0.002** *-4.234*	-0.002** *-8.520*	-0.002** *-8.541*
Other income (000)	-0.0659* *-2.509*	-0.0639* *-2.343*	-0.0416 *-1.914*	-0.0332 *-1.524*			0.129 *1.019*	0.1453 *1.199*
Indep. Agr. act.					0.478* *2.155*	0.478* *2.156*	0.817** *5.645*	0.833** *5.927*
Indigenous	0.052 *0.268*	0.037 *0.187*	0.212 *1.828*	0.184 *1.577*	-0.013 *-0.076*	-0.013 *-0.075*	0.536** *4.988*	0.532** *4.976*
Migrant					0.248 *1.156*	0.248 *1.155*		
Married	0.801** *4.670*	0.799** *4.676*	-0.417** *-4.729*	-0.404** *-4.637*	0.661** *3.375*	0.661** *3.350*	-0.187* *-2.125*	-0.193* *-2.276*
Number of child. 0-5	0.193** *2.720*	0.183* *2.424*			0.040 *0.496*	0.041 *0.472*	0.074 *1.854*	0.042 *0.907*
Number of child <age 1			-0.274** *-2.886*	-0.284** *-2.973*				
Number of child.. 1- 2			0.024 *0.204*	0.039 *0.324*				
Number of child. 2- 3			0.071 *0.741*	0.035 *0.361*				
Number of child. 3- 4			0.149 *1.497*	0.101 *1.025*				
Number of child. 4- 5			-0.065 *-0.918*	-0.121 *-1.497*				
Number of child. 5-15	0.039 *0.783*	0.033 *0.599*	-0.030 *-0.880*	-0.057 *-1.510*	-0.035 *-0.659*	-0.034 *-0.646*	-0.002 *-0.054*	
HH women 16-25	-0.234** *-3.336*	-0.235** *-3.342*	0.029 *0.683*	0.026 *0.607*	-0.076 *-1.017*	-0.076 *-1.011*	-0.001 *-0.024*	0.016 *0.280*
HH women 26-65	-0.078 *-0.859*	-0.074 *-0.804*	0.012 *0.203*	0.034 *0.579*	-0.323** *-3.040*	-0.323** *-3.059*	-0.121 *-1.713*	-0.126 *-1.813*
HH men 16-25	0.070 *1.036*	0.072 *1.060*	0.016 *0.375*	0.021 *0.497*	-0.071 *-0.722*	-0.071 *-0.722*	-0.133* *-2.409*	-0.130* *-2.375*
HH men 26-65	0.019 *0.236*	0.028 *0.327*	-0.073 *-1.293*	-0.051 *-0.868*	-0.198 *1.860*	-0.198 *-1.851*	-0.245** *-2.909*	-0.257** *-3.007*
Constant	-2.676** *-3.407*	-2.668** *-3.410*	-1.951** *-4.585*	-1.930** *-4.547*	-0.694 *-1.209*	-0.693 *-1.204*	-1.808** *-7.273*	-1.942** *-7.803*
Error from the first stage (000)		-0.0513 *-0.349*		-0.1789* *-1.968*		0.00367 *0.026*		-0.000187 *-1.832*
Number of obs.	1621	1621	1819	1819	1931	1931	2098	2098
Joint signif. Of the regressors	Wald chi2(15)= 265.940 Prob>chi2 =0.000	Wald chi2(16)= 264.930 Prob>chi2=0.000	Wald chi2(19)= 201.280 Prob>chi2= 0.000	Wald chi2(20)= 198.990 Prob>chi= 0.000	Wald chi2(15)= 88.870 Prob>chi= 0.000	Wald chi2(16)= 92.630 Prob>chi= 0.000	Wald chi2(16)= 315.560 Prob>chi2= 0.000	Wald chi2(16) = 304.770 Prob>chi2 0.000
Pseudo-R sq.	0.241	0.241	0.061	0.063	0.232	0.232	0.166	0.169

Absolute value of t statistics in italics, * significant at 5%; ** significant at 1%. NB: Iindep. Agr Act: indep agricultural activity; HH: household

6.1.2. Food transfers and hours worked

The finding that transfers increase female participation in urban areas is interesting when contrasting it with the results are reported in table 13.

Table 13 Hours worked equations

	Urban				Rural			
	Men	**Men IV**	**Women**	**Women IV**	**Men**	**Men IV**	**Women**	**Women IV**
	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*	Coef *t*
Transfer (000)	0.010 *0.479*	0.025 *0.546*	-0.079* *-2.209*	-0.119 *-1.684*	0.045** *2.755*	0.030 *0.709*	0.016 *0.783*	0.011 *0.197*
Log wage	0.894* *2.053*	0.882* *2.015*	-1.212* *-1.992*	-1.265 *-1.964*	-0.923** *-4.104*	-0.924** *-4.114*	-0.340 *-0.991*	-0.343 *-0.996*
Log wage squared.	-0.401 *-1.872*	-0.393 *-1.814*	1.185* *2.076*	1.254* *2.104*	0.549* *2.185*	0.543* *2.174*	0.614 *1.552*	0.614 *1.550*
Age	0.073** *3.508*	0.073** *3.460*	0.109** *3.516*	0.103** *3.323*	0.092** *10.804*	0.092** *10.798*	0.077** *7.195*	0.077** *7.217*
Age squared	-0.001** *-3.174*	-0.001** *-3.121*	-0.001** *-3.351*	-0.001** *-3.136*	-0.001** *-9.486*	-0.001** *-9.488*	-0.001** *-6.362*	-0.001** *-6.412*
Married			-0.153* *-2.181*	-0.160* *-2.377*				
Migrant					0.010 *0.220*	0.011 *0.244*		
Other income (000)	0.004 *0.360*	0.005 *0.406*	0.028 *1.148*	0.028 *1.157*				
Indigenous	0.468* *2.211*	0.458* *2.151*	0.243* *2.186*	0.242* *2.097*	-0.146** *-2.666*	-0.146** *-2.676*	0.207** *2.998*	0.206** *2.989*
Indig.* log (wage)	-0.580** *-2.629*	-0.576* *-2.587*						
Value agric. property (000)					0.002 *1.872*	0.002 *1.916*	0.004** *2.739*	0.004** *2.701*
Value agric. prop*log(wage)							0.035** *4.019*	0.035** *3.894*
Number. child. 0-5	0.049* *2.092*	0.046 *1.784*	0.016 *0.423*		0.034 *1.739*	0.039 *1.799*	0.001 *0.030*	0.002 *0.070*
Number child. 5-15	0.046* *2.249*	0.043* *2.182*	-0.045 *-1.419*		-0.059** *-3.930*	-0.056** *-3.394*	-0.054** *-3.002*	-0.054** *-2.951*
HH women 16-25					0.003 *0.085*	0.002 *0.052*	0.080* *2.142*	0.079* *2.070*
HH women 26-65					0.053 *1.643*	0.053 *1.671*	0.121* *2.345*	0.121* *2.341*
HH men 16-25					-0.029 *-1.049*	-0.029 *-1.043*	-0.013 *-0.334*	-0.014 *-0.339*
HH men 26-65					-0.071 *-1.659*	-0.071 *-1.647*	-0.127* *-2.434*	-0.127* *-2.432*
HH indep. agric. activity							-0.098 *-0.837*	-0.099 *-0.840*
Land							0.008 *1.767*	0.008 *1.776*
Land* N of men 16-25							-0.007** *-2.675*	-0.007** *-2.672*
Constant	4.010** *10.719*	4.016** *10.652*	3.971** *7.864*	4.063** *8.354*	4.453** *26.985*	4.452** *26.949*	4.106** *17.445*	4.110** *16.755*
Number of obs.	1133	1133	819	819	1440	1440	1430	1430
Joint signific.	F(10,115)= 5.970 Prob>F=0.000	F(10,115)= 5.930 Prob >F=0.000	F(10,115)= 4.190 Prob >F=0.000	F(10,115)= 4.410 Prob >F=0.000	F(20,117)= 13.900 Prob >F=0.000	F(20,117)= 14.210 Prob >F=0.000	F(17,120)= 14.210 Prob >F=0.000	F(17,120)= 10.570 Prob >F=0.000
R-squared	0.10		0.056		0.185		0.13	
OID		Chi(65)=68.165 P>Chi= 0.370		Chi(65)= 79.77 P>Chi=0.075		Chi(84)= 149.366 P>Chi=0.000		Chi(84)= 172.242 P>Chi=0.000
End. test		t: -0.970		t: 0.942		t: 0.881		t: 0.841

Absolute value of t statistics in italics, * significant at 5%; ** significant at 1% The rural men models control also for different types of land tenure.

When modelling the number of hours that individuals in different sectors work we found that transfer seem to significantly affect behaviour only for men in rural areas (positively) and for women in urban areas (negatively). The positive effects of transfers on the number of hours worked by men is somewhat puzzling. A possible explanations directly related to food transfers is that men in rural households receiving the transfer enjoy better nutrition and therefore can work longer hours. As far as women are concerned, a negative effect is less surprising as it reflects an expected income effect. It is interesting to note, however, how this effect is opposite than in the case of participation, and how, had we estimated a tobit as in the Cortez model, we would not have identified this duality of effects.

6.2. The predicted impact of food transfers on monetary poverty

The results we have just shown highlight how the impact of food transfers on monetary poverty is reinforced by the endogenous changes in household resources caused by the transfers. These endogenous changes vary across different groups. As far as rural households are concerned, we find that transfers have a positive and almost significant effect in stimulating female participation in the labour market and a positive effect on the number of hours worked by men. This allows us to exclude that food transfers are creating disincentives to labour market participation in the rural areas. In the urban areas we do find a disincentive to female labour market participation, but a rough check on the size of this effect suggests that on average women enjoy 13.5 hours of additional leisure due to the transfers per year. This amounts to an imputed change in household per capita income of 0.2%. This effect is compensated by a positive effect on participation.

Estimating this participation effect requires more assumptions. We have estimated that in our model the percentage of women who have a probability higher than 50% of working when the transfer is positive, and lower than 50% otherwise, is 19%. Such an estimate is of course greatly influenced by the slope of the estimated probability function in the area of evaluation, [61] and as such we would not want to attach too much value to it. The potential effects of transfers in increasing participation (at least given their current level and distribution) are likely to offset the potential loss of household income through urban women's increased leisure.

The variety of effects we have described can be visualised by graphing the predicted changes in income caused by withdrawing the transfers, taking into account their effects on labour market decisions. [62] We plot cumulative distribution functions as this representation allows us to discuss the effects of food transfers on monetary poverty for a range of poverty lines (Atkinson 1989). [63] An alternative representation of these findings, highlighting the impact of the transfers on both the mean and the distribution of income is presented in Appendix 3.

In figure 5 below we combine the effects of transfers on participation and hours worked (as well as the withdrawal of the transfer) by plotting the cumulative distribution of per capita income as predicted by our models (labelled as "income") for individual of working age and contrasting it with the predicted income distribution without the transfer (labelled as "without transfer"). As expected the simulated current distribution dominates the ex-ante one, for a range which includes observation approximately up to the 7th decile (the 75th percentile is 3700 soles). Such a range

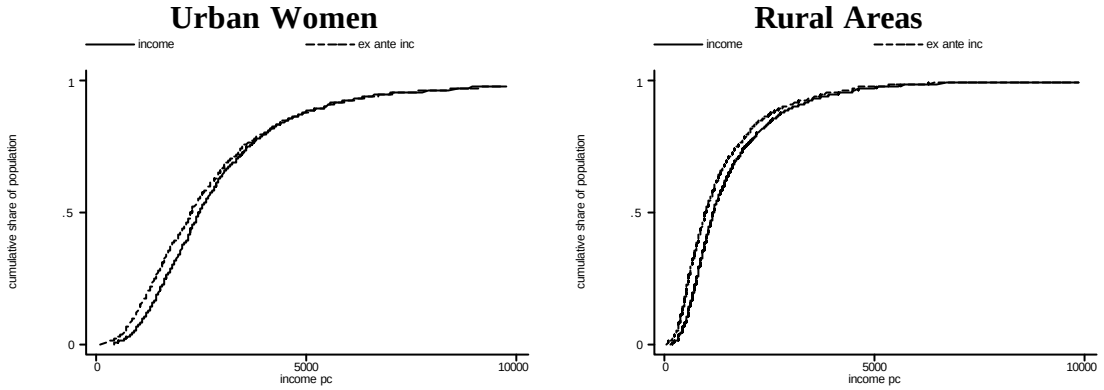
[61] It would for example rise to 44% if we considered the threshold of 80%, which is the average predicted probability for women who work.

[62] We have assumed that every change in the income earned by individuals in each group, as well as the decrease in income due to the withdrawal of food transfers, is shared equally over the members of the households. Note therefore, that though our simulations include only individuals of working age, they reflect – and keep constant – whatever else is happening to the incomes of other household members.

[63] In this case, this procedure seems preferable to arbitrary setting a poverty line in terms of income.

seems to encompass most plausible estimates of a poverty line in Peru (as a comparison consider that the incidence of monetary poverty is estimated with a consumption indicator to be around 51%).

Figure 5 Labour market responses to transfers and the income distribution (overall effects)



Panel (a) **Panel (b)**

7. Is the stone killing two birds?

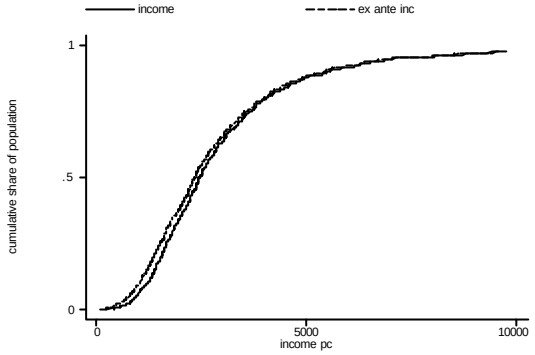
In this paper we evaluate one specific kind of anti-poverty intervention in terms of its ability to alleviate both a monetary and a capability based definition of poverty. An important issue which arises with this duality of perspectives is whether the policy objectives they identify are compatible. In this brief section we consider this issue by bringing together the evidence we have gathered on the impact of food transfers on these dimensions separately, and in considering how they interact.

In panel (a) and (b) of figure 6 we present the overall distribution of income in rural and urban areas before the introduction of the transfers.[64] In urban areas the positive effect of the transfers through their impact on female labour market behaviour is lessened by considering the contribution to household income of working age men, whose labour market behaviour is not affected by the transfer. In panel (c) and (d) we simulate the effects on child height for age z score factoring in both the direct change brought about by the withdrawal of food transfers we analysed previously, and the indirect changes caused by the transfers though their impact on household income. The ex ante distribution is dominated by the current one in a range relevant for poverty analysis, especially in rural areas.

[64] Panel (b) in figure 7 replicates panel (b) of figure 6 above and is provided just for the sake of comparison.

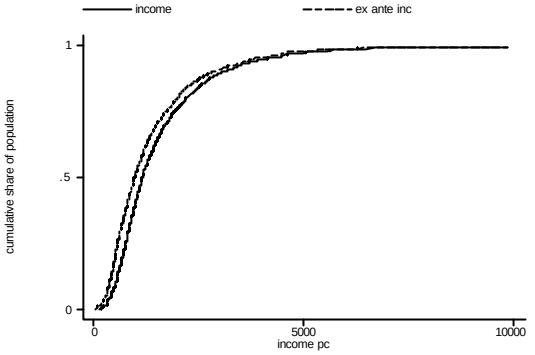
Figure 5 The overall effect of food transfers on monetary poverty and nutrition

Effects on income distribution: Urban areas



Panel (a)

Effects on income distribution: Rural areas

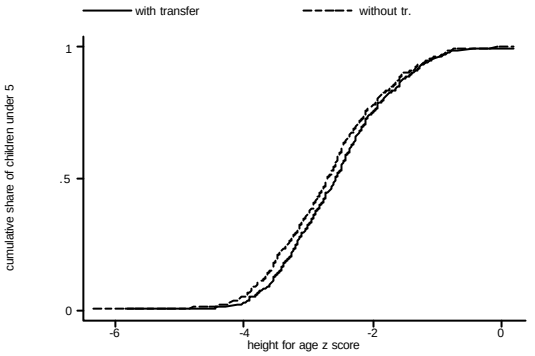


Panel (b)

Overall effect of transfers on z score: Urban areas

Panel (c)

Overall effect of transfers on z score: Rural areas



Panel (d)

An interesting element which emerges from comparing the overall distribution of the height for age z score over the two areas is that in urban areas the bulk of the improvement in the z score appears to take place in the range –4 to –2, therefore for children at nutritional risk. In the rural areas, the change seems to reach better nourished sections of the distribution as well. Whether these results depend on the different characteristics of the programmes in urban and rural areas, or rather on the characteristics of the distribution of malnutrition in the two contexts would, however, entail a much more in depth analysis of the *modus operandi* of the programmes that it is possible to perform here. While raising some issues for further research, figure 6 summarises the key result of this paper: in the Peruvian case the pursuit of a nutritional objective does not interfere with the reduction of poverty in monetary terms but rather enhances it, despite contrary theoretical expectations. [65]

Conclusions

In this paper we have discussed the effectiveness of the Peruvian food transfers system by considering its impact on both monetary and non-monetary dimensions of poverty (for which we focused on malnutrition). In assessing the effectiveness of food transfers from these two

[65] As discussed in section 1.3.3. this overall assessment is still partial, as we do not consider all the possible feedbacks between achievements in these different dimensions. Available evidence suggests, however, that the effects of increased maternal labour efforts on child malnutrition via diminished care is generally outweighed by increased maternal earnings (Haddad, Hoddinott and Alderman 1997). Further, other potential effects such as the improved nutrition-increased income link can be considered implicitly captured by our estimates of the impact of food transfers' receipt on the labour market.

perspectives we considered whether food transfers are reaching the poor, what their impact is on both types of deprivation, and whether these impacts reinforce or undermine each other. We started by reviewing the main issues raised in the literature with respect to in-kind transfers, highlighting the debates surrounding their justification and effectiveness. These centre on their ability to effectively increase food consumption, and on the possibility that endogenous changes in household resources might diminish the reduction in monetary poverty. In addition, we considered some concerns on the appropriateness of an emphasis on food in order to reduce malnutrition. We also presented the main features of the Peruvian food transfer system. A plurality of actors and modalities of distributing and targeting the benefits was identified, together with heterogeneous coverage, and a high percentage of overlap. This variety seems to drive the varied results of existing assessments of different aspects of their performance, and calls for an overall empirical assessment of the system.

In considering the ability of food transfers to reach the poor from both a nutritional and a monetary perspective, we highlighted how the bulk of the benefits does not reach the poorest. At the same time, the transfers represent a significant proportion of the resources of the most deprived. We then considered the determinants of transfer receipt to identify what determines access to the benefits. An important result which helps explain why the transfers are not very effective at channelling their benefits towards the poor is that, while participation in food transfer programmes positively depends on low levels of income and living in rural areas, these variables are respectively insignificant and negatively determining the amount of transfers. This finding calls into question the current allocation of the benefits, and suggests that alternative modalities of distribution should be found.

We then considered the impact of the transfers on nutrition. We first analysed this issue indirectly, by considering whether food transfers are succeeding in increasing household consumption of food. We then considered directly whether food transfers have an independent effect on child nutritional status. The evidence we present reveals that in-kind food transfers have a positive effect on food availability at the household level. We do not find, however, an independent effect of food transfers, as a whole, on child malnutrition beyond the one they have by increasing household resources. Further exploration of this relationship showed, however, that some programmes do have an independent effect, possibly also as they are effective at sensitive stages of child development.

We then considered the overall effect of food transfers on monetary poverty by testing for possible changes in household resources due to changes in labour market behaviour. We found that the behaviour of different agents is affected in different ways – in urban areas, for example, the introduction of the transfers does not affect men's labour market behaviour, while it increases women's participation and decreases their number of hours worked. Overall, however, our results suggest that changes in labour market behaviour reinforce the effect of food transfers in diminishing monetary poverty, an effect robust for a wide range of poverty lines.

Finally, we considered the interdependence of the transfers' impact on household monetary resources and nutrition by predicting nutritional outcomes incorporating both labour market effects as well as the direct nutritional impact. Though we could not factor in some of the possible effects, such as the effect of the transfers on time available for child care, we find that, especially in rural areas, the transfers are effectively contributing to the reduction in malnutrition. Our results raise, however, important issues on the types of programmes which are currently implemented, and call for a reconsideration of their modalities of targeting and distribution. It seems in fact that more could be done to boost the transfers' nutritional effectiveness by finding more effective ways of reaching malnourished children, by understanding better the interactions between child development and characteristics of the programmes, as well as by building on the features which

characterise programmes with an additional positive impact on nutrition, beyond the impact through increased income.

Beyond the specific contribution of this paper to the debate on the effectiveness of poverty alleviation strategies in Peru, it should be emphasised that the evaluation of poverty reduction interventions from different profiles appears as very topical, given the emphasis on multidimensional definitions of poverty. If, in fact, poverty reduction policies aim to alleviate multiple deprivations, identifying interventions which improve outcomes in more than one dimension is a first step in devising truly multidimensional strategies.

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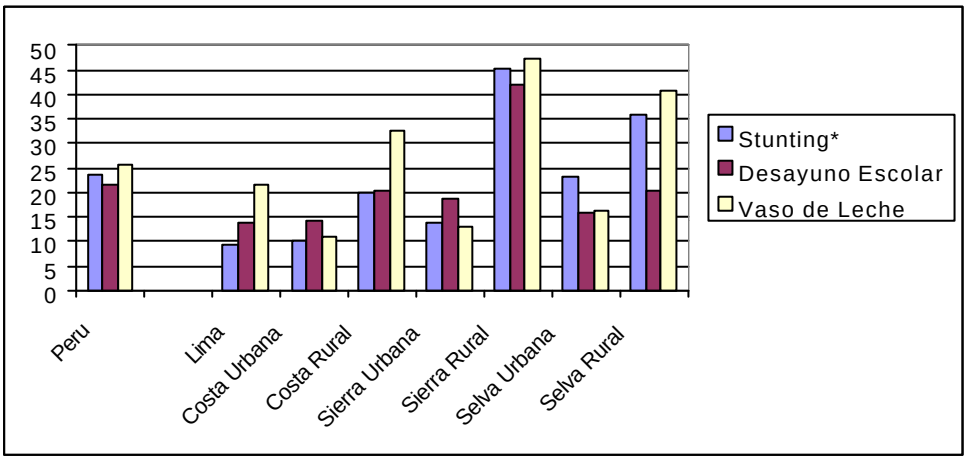
Appendix 1

In this appendix we consider the geographical distribution and the targeting performance of the two major programmes nutritional programmes in Peru: the glass of milk and the school breakfast. These two programmes combined cover about 50% of the Government nutritional budgets (World Bank 1999), and both aim to reduce child malnutrition.

A study by Cortez and Calvo (1997) found that in 1994, the glass of milk programme had a distribution "sufficiently close" to the proportion of malnourished children by region. We consider again the picture for 1997. It should be noted that strictly speaking the school breakfast is not relevant for children aged 0-5, but rather for their elder siblings going to school. To the extent that malnutrition depends from the household long-term living conditions, rather than from cyclical factors, however, stunting of the 0-5 can be taken to be a reasonable predictor of malnutrition for all the children in the household.

As shown in figure A.1 the allocation of the school breakfast programme among regions seems to follow more closely child malnutrition rates than the glass of milk. For example the two areas with the least incidence of malnutrition (Lima and the Costa Urbana) are the ones where fewer households receive the school breakfast, while Lima has more beneficiaries of the glass of milk than the Selva Urbana, despite the fact child malnutrition is 2.5 times higher in the latter region. In general, however, apart from prioritising the area with the highest incidence of malnutrition, it does not seem that malnutrition rates are the only driving indicator in deciding allocations between regions.

Figure A.1 The incidence of stunting and the percentage of households beneficiaries of the two main food transfer programmes



* percentage of children 2 standard deviation or less in terms of height for age, over relevant age group

For the same two programmes we have also considered some indication of their targeting performance (see table A.1), in order to see how effectively they were reaching their target group.

Table A.1 Targeting performance of major food transfers programmes

	stunted children in recipient households (% of tot. stunted children)		**non stunted children in recipient households (% of tot non stunted children)**	
	Desayuno Escolar	Vaso de Leche	Desayuno Escolar	Vaso de Leche
Peru	38.96	62.04	25.58	38.43
Lima	23.13	42.54	19.79	31.89
Costa Urbana	13.64	36.36	16.89	15.98
Costa Rural	17.50	57.50	25.97	50.65
Sierra Urbana	25.00	35.71	22.22	28.89
Sierra Rural	54.76	76.19	50.45	72.32
Selva Urbana	26.42	37.74	15.98	21.89
Selva Rural	28.40	65.43	21.26	55.75

In all regions the glass of milk programme has a higher coverage of stunted children, though even in the region where it is more successful one third of the target population is not reached by the transfers. The interpretation of the last two columns is more problematic as the programmes could lead children to fall into the non-stunted category. Assuming that only for a limited percentage of the children this is the case, it appears that in every region the glass of milk also has higher leakage to the non target population. The indication we get from this analysis as concerns food transfers, therefore, is that the glass of milk programme and the school breakfast are not prioritising entirely their expenditure towards their intended target group, i.e. malnourished children, and that their performance is characterised by serious undercoverage and leakages.

Appendix 2

In this appendix we present the wage regressions adopted to predict a wage for all the population of working age. The specifications we adopted include age and race and educational variables, as well as whether the household engages in independent agricultural activities for the rural equations (our data does not allow us to attribute this activity to one particular member). The demographic structure of the household as well as interactions between land variables and demographic variables for rural areas, which can have a bearing on whether individuals report a wage or not, were used only in the first stage of the Heckman procedure and excluded from the wage equation.

Figure A.2 Hourly wage equation

	Urban		Rural	
	Men	**Women**	**Men**	**Women**
	Coef	Coef	Coef	Coef
	z	*z*	*z*	*z*
Age	0.042**	0.082**	0.044	0.027
	2.779	*4.178*	*1.837*	*1.274*
Age Squared	-0.0004*	-0.001**	-0.0005	-0.0003
	-2.378	*-3.812*	*-1.672*	*-1.096*
Completed primary school	0.260	-0.054		
	1.210	*-0.231*		
Years of primary attended	0.031**	0.053**		
	2.838	*4.289*		
Completed secondary school	0.168*	0.252*		
	2.330	*2.460*		
Years of schooling			0.008	-0.002
			0.326	*-0.057*
Years of schooling squared			0.003*	0.005**
			2.082	*2.642*
Indigenous	-0.043	0.003	-0.184*	-0.100
	-0.537	*0.030*	*-2.285*	*-0.877*
HH independent agricultural activity			-0.391**	-0.467**
			-4.396	*-5.052*
Mills ratio	-0.296**	0.178*	0.341*	0.278*
Constant	-0.487	-1.605**	-0.486	-0.644
	-1.351	*-3.731*	*-1.018*	*-1.531*
N. of observations	1621	1819	2229	2220
Joint significance	Wald chi2(6)= 80.89	Wald chi2(6)= 134.80	Wald chi2(6)= 130.08	Wald chi2(6)= 89.07
	Prob>chi2= 0.000	Prob>chi2= 0.000	Prob>chi2= 0.000	Prob>chi2= 0.000
Test of indep. equations	Wald chi2(1)= *7.59*	Wald chi2(1)= *4.47*	Wald chi2(1)= *4.35*	Wald chi2(1)= *5.03*
	Prob>chi2= 0.000	Prob>chi2= 0.000	Prob>chi2= 0.000	Prob>chi2= 0.000

t tests reported in italics., Absolute value of t statistics in italics, * significant at 5%; ** significant at 1%

As shown by the Wald test of independent equations we could not accept the hypothesis that the two stages of the procedure were independent.[66] In the case of the urban areas we seem to have been able to identify more significant regressors than in the rural ones, with both age and schooling variables appearing as significant. This result is not surprising in the light of the different characteristics of the urban and rural markets (not least the possibility that the returns to education might vary by sector and type of activity), the thinness of markets due to subsistence activities and small scale agriculture in particular. Further, agricultural experience might have more explanatory

[66] See StataCorp (1999), vol.2, "Heckman".

power than schooling in determining wages in rural areas. In this respect it is interesting to note how belonging to a farming household reduces wages significantly for both men and women living in rural areas. This could reflect the low productivity of the jobs available to labourers in the agricultural sector. Further, especially in the case of rural men, we might expect the wage variable we are trying to explain to be particularly noisy, as it captures the variety of activities conducted on an annual basis, including seasonal migration to urban areas, which anecdotal evidence suggests can often represent the main source of monetary incomes for households in isolated rural communities.

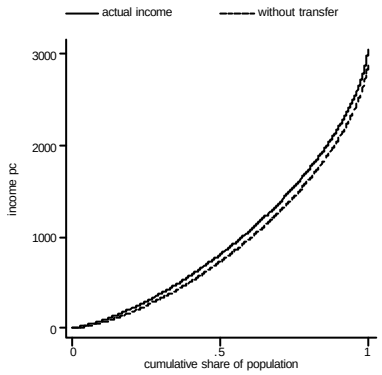
Appendix 3

In this appendix we present some of the results of section 6.2 and 7 in a different way. We look a the distribution of income with and without the transfers by graphing Generalised Lorenz Curves (GLCs). We do not present GLCs for the distribution of the child height-for-age standard score as in our sample most of the observations lie in the negative domain. The advantage of this type of representation is that it allows us to consider jointly how transfer receipt affects the mean of distribution as well as how equitably such increase is distributed. As the GLC can be obtained from a standard Lorenz curve by rescaling the *y* axis by mean income, the *y* value corresponding to *x=1* represents the mean of the distribution. In a GLC, therefore, the shape of the curve shows the degree of inequality, while *f(x=1)* shows the mean of the distribution.

Figure A.3 Labour market responses to transfers and the income distribution (partial effects)

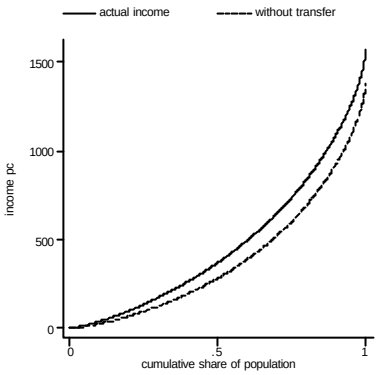
Changes in participation for:

Urban Women



Panel (a)

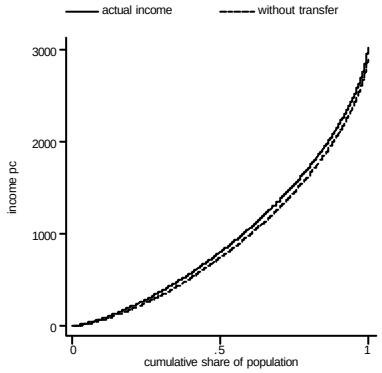
Rural Women[67]



Panel (b)

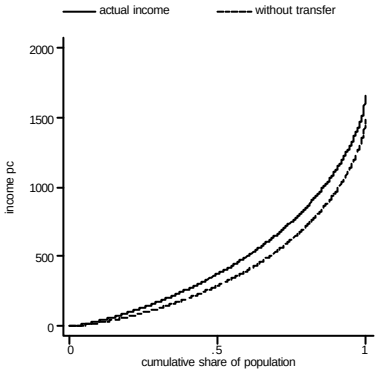
Changes in hours worked for:

Urban Women



Panel (c)

Rural Men



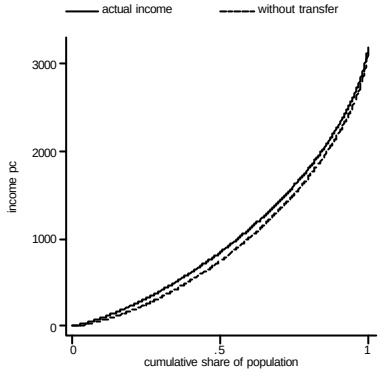
Panel (d)

Figure A.1 and A.2 allows us therefore to see that the largest effect of food transfers on both equality and mean income is to be found in rural areas. Figure A.2 in particular emphasises how the transfers have an equalising effect, independently of how much they increase average income.

[67] These are conservative simulations as we used the results from the non-instrumented model (as the coefficient on transfers was significant at conventional confidence levels though most probably attenuated).

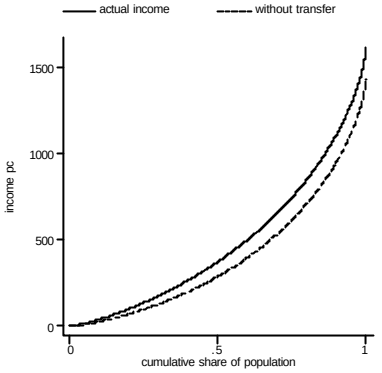
Figure A.4 Labour market responses to transfers and the income distribution (overall effects)

Urban Women



Panel (a)

Rural Areas



Panel (b)