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Do transfers generate local economy effects?

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Abstract

The paper examines local economy effects of social transfers, by focusing on food consumption and asset holdings of non-eligible households in rural Mexico following the introduction of PROGRESA in 1997. The quasi-experimental nature of the evaluation data collected for the purposes of evaluating the impact of PROGRESA enables the quantification of this impact. In the paper we compare welfare indicators among non-eligible households in treatment areas and control areas. The analysis finds that non-eligible households in treatment areas show significantly higher levels of food consumption and asset holdings following the introduction of PROGRESA, compared to non-eligible households in control areas. These results are interpreted to suggest that transfers in poor rural areas in Mexico enable agents to interact more strategically such that non-beneficiaries, as well as beneficiaries, reap consumption and production advantages.

Keywords: Mexico, PROGRESA, social transfers, poverty, assets, food consumption

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Introduction

In the last decade, large-scale poverty reduction programmes providing income transfers to households in extreme poverty have been introduced in Latin America, Africa, and Asia.¹ A growing literature assesses the direct impact of these programmes on beneficiaries.² Economic theory and direct observation suggest that cash injections into impoverished communities resulting from the introduction of social transfers could well have effects beyond welfare improvements among direct beneficiaries. To the extent that economic activity in these communities is constrained by deficiencies in effective demand, liquidity, or credit; social transfers could partially lift these constraints and stimulate trade and asset accumulation. However, evidence on the local economy effects of social transfers is scarce. The paper aims to help fill in this gap, firstly by providing evidence on the incidence and significance of these effects of PROGRESA in Mexico, and secondly by arguing that transfers lead to strategic complementarities at the local level that enable non-beneficiaries, as well as beneficiaries, to reap consumption and production advantages.

The evidence base for the effectiveness of social transfers in reducing poverty and vulnerability in developing countries is growing rapidly, facilitated by the strong impact evaluation processes of some of these programmes. Studies have naturally focused on identifying the impact of the programme on beneficiaries. Impact evaluation studies of PROGRESA/OPORTUNIDADES find large and positive effects on the consumption, schooling, health, and nutrition of beneficiaries (Schultz, 2000; Skoufias, 2001; Skoufias, Davis and de la Vega, 2001; Albarran and Attanasio, 2002; Attanasio and Lechene, 2002; Rubalcava, Teruel and Thomas, 2002; Coady, 2003; Martinelli and Parker, 2003; Rubalcava and Teruel, 2005). There is also some evidence of asset accumulation among PROGRESA beneficiaries.

Less is known about the effects of social transfer programmes on the local economy, despite the fact that in many cases social transfers represent a large injection of liquidity into rural areas (Coady, 2003). Studies on transfer programmes in developing countries strongly suggest the presence of local economy effects (Ardington and Lund, 1995; Delgado and Cardoso, 2000; Schwarzer, 2000), but evidence on their incidence and significance is limited. A promising avenue is to focus on the impact of a social transfer programme on non-beneficiary households using PROGRESA evaluation survey data. The structure of the evaluation data collected by PROGRESA covering the period 1998-2000, enable difference-in-difference estimates of the impact of PROGRESA on non-eligible households. Few studies on these are available. Gertler, Martinez and Rubio-

¹ For a description of these programmes see the Social Assistance in Developing Countries database available from www.chronicpoverty.org (Barrientos and Holmes, 2007).

² See, for example, comparative studies of conditional transfer programmes (Morley and Coady, 2003; Das, Do and Ozler, 2005; Rawlings and Rubio, 2005).

Codina (2005) test whether investment in assets can be observed among this group, but find no significant effect. Angelucci and De Giorgi (2006) consider possible effects of PROGRESA on the consumption of non-eligible households. They compare food and non-food consumption by non-eligible households and find that, after the introduction of PROGRESA, consumption is higher in treatment areas than in control areas.

This paper will follow this route to identifying local economy effects from transfers. Following Angelucci and De Giorgi's paper, it will measure changes in household welfare among non-eligible households in rural Mexico following the introduction of PROGRESA in 1997. The paper aims to complement and extend the scarce literature available in several ways. Our paper covers changes in food consumption among non-beneficiary households, and here our findings confirm the findings in Angelucci and De Giorgi. We also extend the literature by developing a more detailed focus on assets. The analysis on assets delivers interesting new findings. In contrast to the available literature we find some evidence of improvements in asset holdings among non-beneficiary households. In particular, we investigate assets changes among non-beneficiary households with very low asset levels before the introduction of PROGRESA and find that asset accumulation among these households is stronger. This points to the presence of strategic complementarities among low asset non-beneficiary households, perhaps the group with stronger interactions with PROGRESA beneficiaries. Our paper also extends the literature by utilising all available waves of data. A particular contribution of the paper is the fact that we exploit the panel structure of the data to investigate whether non-beneficiaries in treatment area show a higher growth rate in consumption and assets following the introduction of PROGRESA than non-beneficiaries in non-treatment areas. Our main findings indicate there are positive and significant differences in observed changes in the consumption and assets of non-eligible households in treatment areas compared with non-eligible households in control areas. These findings are interpreted to imply the presence of strategic complementarities between non-beneficiary and PROGRESA recipients. Whereas changes in consumption and assets among beneficiary households can straightforwardly be attributed to the income supplements provided by the transfers, parallel changes in consumption and assets among non-beneficiaries require clarification of potential channels through which these effects arise. The paper reports findings from the available literature to identify likely channels for the local economy effects of PROGRESA transfers.

The presence of strategic complementarities resulting from social transfers has important policy implications, implying that social transfer programmes are able to achieve much more than to raise welfare among direct beneficiaries. They could also promote and encourage wider growth effects among non-eligible groups and the local economy. Establishing whether social transfers have effects beyond beneficiaries, and through facilitating better interaction of agents, would lead to a more accurate assessment of the benefits flowing from them.

The paper is organised as follows: section 1 provides a brief review and discussion of existing literature on the local economy effects of social transfers. Section 2 describes the data used in the study, while section 3 discusses appropriate methodologies and estimation strategies. Section 4 reports on the main findings, firstly those relating to household food consumption and then those relating to asset holdings. Section 5 considers the possible channels and processes through which strategic complementarities operate. A final section summarises the main conclusions.

1. Local economy effects of social transfers

Studies on transfer programmes in developing countries strongly suggest the presence of local economy effects. Early studies of the social pension in South Africa, for example, remarked upon the fact that transfers stimulated local production and trade (Ardington and Lund, 1995). In remote rural locations in South Africa, transfers are delivered by armoured transport on a particular day and time, usually pre-announced on the local radio. On that day, traders bring their wares to that location while loan sharks come to lend or collect money. Observers would find it hard not to conclude that social pensions have effects on the local economy. In Brazil, where beneficiaries of social transfers are provided with a magnetic card to access their benefits from banks or post offices, researchers have noted that possession of these cards facilitates access to credit from financial institutions (Schwarzer, 2000). Entitlement to regular and reliable transfers makes beneficiaries credit-worthy. Transfers can also have effects upon employment. In the Kalomo District Pilot Social Transfer Scheme, which pays only US\$7 a month to the poorest ten percent of households, and where most beneficiary households are headed by older and disabled people, it has been observed that transfers enable beneficiaries to employ other villagers to tend their fields (Schubert, 2005). These examples suggest the strong likelihood of local economy effects from cash transfer programmes.

The view that cash injections into communities affected by liquidity or credit constraints could act to stimulate the local economy has a long tradition in economics. It reflects canonical views about the working of multipliers, say from Keynesian models which focus on the effects produced by of agent interactions. A classic article by Cooper and John distinguishes between three different types of effects (Cooper and John, 1988). Spillovers occur where the actions of some agents confer external benefits on their neighbours. Typically, this is the example of a flower farmer who benefits from next door's bee keeper. Strategic complementarities on the other hand refer to the possibility that the strategy followed by one agent improves the optimal strategies of others. For example, road or irrigation improvements from one farmer that enable an improved allocation of productive resources by her neighbours. Finally, there are community multipliers which arise where the benefits from a collective response by a community to economic opportunity exceed the benefits of individual responses. Some studies have

identified spillovers from PROGRESA, for example by examining whether improvements in schooling and health utilisation by non-beneficiary households in treatment areas could be explained through a 'demonstration effect' (Handa, Huerta, Perez et al. 2000 #1281). The behaviour of beneficiary households could have been emulated by non-beneficiary households, thus resulting in increased school enrolments or clinic visits among the latter group. Our paper focuses mainly on the second category, the likelihood that large scale transfers generate strategic complementarities. The intuition is that the impact of transfers on the consumption and assets of beneficiary households could have improved the optimal productive strategies of non-beneficiary households, through opportunities for improved resource allocation for example. Because our empirical work focuses on non-beneficiary households, we are not in a position to examine multipliers, in the way it is defined by Cooper and John.

A focus on social transfers and strategic complementarities echoes recent work examining the role of initial conditions and of non-convexities in nutrition, production, or monitoring in generating poverty persistence (Dasgupta, 1997; Banerjee, 2001; Barrett and McPeak, 2005). This work can be used to support the view that transfers could lead to income growth among beneficiaries and over time. Furthermore, in communities where beneficiaries are integrated with non-beneficiaries (some of whom might just be a little bit less poor) through trade, production and financial links, there is every chance that transfers may have effects beyond the direct beneficiaries. The interaction between beneficiary and non-beneficiary households may result in strategic complementarities which improve the productive strategies of the latter and, more generally, the local economy

Some studies examine the private multiplier effects of transfers on the immediate beneficiaries Sadoulet, de Janvry and Davis (2001) examine the income multipliers of PROCAMPO, a cash subsidy programme introduced in Mexico to stimulate agricultural production in the *ejido* sector. The programme provides a subsidy to small farmers based on land cultivated. Their hypothesis is that cash transfers are likely to have large positive effects in rural Mexico due to the presence of liquidity and credit constraints.³ Cash transfers can lift these constraints and ensure a better allocation of labour time. Their study uses two waves of programme data, and regresses variables capturing change over time in a range of assets, plus a cash transfer receipt measure, on changes in income, and finds that "a one peso transfer inducing a direct increase of 1.97 pesos" (Sadoulet, de Janvry and Davis, 2001: 1040). Gertler, Martinez and Rubio-Codina (2005) have looked at whether PROGRESA beneficiaries invest some of the transfers in income generating activities. They find that eligible beneficiaries in treatment areas are more likely to invest in land and livestock than similar households in control areas, and the effects are stronger for households without agricultural assets. This study finds that a

³ Increasing returns due to non-linear production techniques can reinforce the effects of credit or liquidity constraints (Barrett, 2005; Carter and Barrett, 2005).

quarter of transfers are invested in this way, generating an income multiplier of 1.2 for these households, projected to a 24 percent increase in consumption after six years. The study concludes that “increased entrepreneurial activity brought on by cash transfers have increased the potential for self-sufficiency” and sustain long term improvements in welfare (Gertler, Martinez and Rubio-Codina, 2005: 36). Martínez studies the effects of BONOSOL, a universal pension in Bolivia transferring US\$ 240 a year to older people (Martinez, 2007). He finds that that consumption growth associated with pension receipt in rural is twice the amount of the transfer, a multiplier of 2. He argues that this finding is consistent with the transfer lifting liquidity constraints among small rural producers with land but no capacity to purchase agricultural inputs. These studies confirm the presence of multiplier effects of transfers on beneficiaries.

To our knowledge only Angelucci and De Giorgi consider possible effects of PROGRESA on the consumption of non-eligible households (Angelucci and De Giorgi, 2006). They compare food and non-food consumption by non-eligible households and find that, after the introduction of PROGRESA, consumption is higher in treatment areas than in control areas. Their findings provide some evidence of the presence of local income effects.

2. Data

The analysis in the paper uses household data generated from the implementation and evaluation of Mexico’s PROGRESA programme. A brief description of the programme below is followed by information on the dataset used in the paper.

The Government of Mexico introduced in 1997 the *Programa de Educación, Salud y Alimentación* (PROGRESA) providing conditional cash transfers to poor households in rural Mexico (Skoufias, 2001). The programme reflected concerns among policy makers about the persistence of poverty and vulnerability in rural areas, especially in the context of the liberalisation of the agricultural sector, and incorporated the lessons from the failure of previous anti-poverty programmes. PROGRESA provides regular income transfers to poor households with children of school age, conditional on these children attending school, and on household members accessing primary health care. It therefore combines income transfers with basic service utilisation and provision. Beneficiary households are identified through a process involving three levels: first geographic targeting identifies marginalised communities, a second level in which poor households in these communities are selected through a proxy means test, and a third level of community validation. The monthly transfers include a household consumption subsidy, and supplements for each child of school age up to a maximum amount. There is also an annual subsidy for each child of school age to cover the costs of school uniforms and texts. The schooling subsidies increase with the school grade attended, and are higher for girls in secondary school. Transfers are paid to the mother. There is also a subsidy to

health and education providers involved in the programme. PROGRESA seeks to break the intergenerational persistence of poverty through facilitating investment in human capital by poor households.

The programme was rolled on gradually, according to a planned strategy. At the start in August 1997, 140,544 households in 3,269 locations were incorporated into the programmes, with a further 160,161 households joining in November of that year. During 1998, a further 1.63 million households were incorporated into the programmes from 43,485 locations. By 2000, PROGRESA covered 2.6 million households, or 40 percent of all rural households in Mexico. In 1999, PROGRESA absorbed 0.2 percent of GDP, just under 20 percent of the federal poverty alleviation budget (Skoufias, 2001). In 2002, PROGRESA was renamed OPORTUNIDADES by the incoming administration and extended to all other areas of rural Mexico and to marginalised urban areas too. In 2006, OPORTUNIDADES reached 5 million households.

The designers of PROGRESA paid close attention to the evaluation of the programme, and to collection of the data needed to support this evaluation. Census data was employed to rank communities in terms of their socio-economic conditions and to select the most marginalized communities to be incorporated into the programme. A survey of rural households in Mexico ENCASEH (*Encuesta de Características Socio-Económicas de los Hogares*) was collected in 1997 and was used to identify eligible households within the selected communities with the scores from a proxy means test. Follow up surveys of a sample of households for the purposes of evaluating the programme (denominated ENCEL or *Encuesta de Evaluación de los Hogares Rurales*) were conducted every six months between March 1998 and November 2000.⁴ In the empirical work in this paper, we use the datasets for October 1998, May 1999, November 1999, May 2000 and November 2000.⁵ The evaluation datasets sample 24,000 households in 506 communities or states, randomly selected. This sample includes 320 communities in which the programme was implemented in 1998, thereafter referred to as treatment communities; and 186 communities in which the programme was delayed until the end of 2000.⁶ The advantage of this sample design is that it enables the comparison between treatment and control areas in evaluating the impact of the programme.

⁴ A further evaluation survey was collected in November 2003, which included a further 151 communities to act as the new control group. These locations were selected using propensity score matching techniques. This dataset was not used in this report.

⁵ The dataset for March 1998 included questions on expenditures, but these were formulated in a different way to the other follow up surveys and will not be used in the empirical work below.

⁶ The localities were randomly selected using proportionate to size probabilities from the full sample of communities in seven states in which the programme was implemented by November 1997 and from the full sample of communities in which the programme was planned to begin in by December 2000 (Skoufias, 2001).

3. Methodology

Studies of impact evaluation of social cash transfer programmes require the identification of an appropriate counterfactual. The quasi-experimental nature of the PROGRESA data, in which marginalised communities are randomly selected into a control or treatment group, and households in these communities are identified as eligible and non-eligible, prior to implementation, comes closest to providing an optimal counterfactual. Eligible (non-eligible) households in control areas are an appropriate counterfactual for eligible (non-eligible) households in treatment areas. In the analysis below we focus exclusively on non-eligible households.

For the purposes of identifying an appropriate strategy guiding the empirical work, the study has followed closely the approach suggested in Angelucci and de Giorgi (2006) and Gertler, Martinez and Rubio-Codina (2005) Angelucci and de Giorgi specify an Indirect Treatment Effect [ITE] estimator for the indirect effects of a social cash transfer on non-eligible households as:

$$ITE = E[Y_i | T_i=1, NE_i=1] - [Y_i | T_i=0, NE_i=1] \quad (1)$$

where Y is the outcome variable and ' i ' indexes households. T is the area indicator, with a value of 1 if it is a treatment area, 0 otherwise. NE is an eligibility indicator for the household, with a value of 1 if non-eligible for the PROGRESA transfer and 0 if eligible. ITE compares the outcome variable for non-eligible households in treatment areas and control areas. Equation (1) shows the expected outcome for non-eligible households in communities where PROGRESA has been implemented minus the expected outcome among non-eligible households in communities where PROGRESA has not been implemented.

The indirect treatment effect, for each of the four periods in which we have information on outcomes for treatment and control groups, can be estimated by Ordinary Least Squares (OLS) using the following equation:

$$Y_{it} = a_t + b_t T_{it} + c_t(X_{it}) + e_{it} \quad ; t=1,2,3,4 \quad (2)$$

where, for each period and for a sample of non-eligible households, Y_{it} is a variable of interest for household i in period t . T_{it} is the area indicator for treatment or control areas in period t , X_{it} is a matrix that contains individual, household and regional level characteristics in period t for household i , and a_t , b_t , and the vector c_t are parameters to be estimated. The parameter b_t identifies the ITE at period t , the indirect effects of the transfers on non-eligible (non-poor) households.⁷

⁷ In the last period, period 4, PROGRESA was fully rolled over to all areas, which means that for this period we cannot differentiate between treatment and control areas. The justification for including this period data

Estimation of (2) on a set of independent cross-sectional data using OLS (PROBIT where the outcome variable is discrete and TOBIT where it is continuous but truncated), relies on the assumption that the random selection of the sample ensures that non-eligible households in treatments areas have similar pre-programme characteristics than those in control areas. While this is true for age, education, access to health care and income of groups in treatment and control areas, Behrman and Todd (1999) found that randomisation is unlikely to control for household level factors (some of which are the outcome variables of interest in our paper). Hence, we use the panel structure of the data to condition out time invariant unobservable differences which could have affected outcome variables post the introduction of the programme. The model to be estimated is:

$$Y_{it} = a + b_1 T_{it} + b_2 t + c(X_{it}) + v_i + e_{it} \quad (3)$$

where the area indicator for treatment or control area for household i in period t (T_{it}) is interacted with each of the four observation periods t . In addition, this equation incorporates period effects by the inclusion of the parameter b_2 , and individual heterogeneity is indicated by the parameter v_i , which can be estimated using fixed effects or random effects.

The option of whether fixed or random effects are utilised is determined by assumptions concerning the correlation of individual heterogeneity (v_i) and the observed characteristics (X_{it}). While random effects models assume no correlation, fixed effects models allow for the presence of correlation (Wooldridge, 2002). Our preferred option is to estimate a fixed effects model, but this is not feasible where the outcome variable is categorical, or continuous but truncated.⁸ Therefore, for outcomes measured as continuous variables, e.g. household consumption, we utilised fixed effects OLS. For outcomes measured as binary variables (e.g. land ownership or livestock ownership) random effects PROBIT models are utilised, and for truncated continuous variables (e.g. hectare use or number of production animals) random effects TOBIT models are used.

4. Results

Outcome Variables

The analysis that follows focuses on two outcome variables: food consumption and assets. Household food consumption is a good proxy for current welfare, especially in

was to compare the impact on non-treated households in treatment areas that have received treatment for more than one period versus non-treated household in treatment areas who have just received the treatment.

⁸ We acknowledge that we could have estimated fixed effects linear probability models for our dichotomous outcome variables or fixed effects linear probability models for truncated outcome variables and ignore the structure of the outcome variable. We opted, however, for the correct modelling of the outcome variable and the inclusion of random effects to deal with time invariant heterogeneity.

the marginalised communities in our data, and assets provide some indication of longer term welfare and vulnerability. Analysis of these two variables across non-eligible households in treatment and control areas will provide information on the extent to which PROGRESA has welfare effects which go beyond those observed for the direct beneficiaries, and therefore an indication of impact on the local economy (descriptive statistics for these outcomes, by treatment and control areas, are shown in Appendix One, Table A1).

The measure of food consumption used below was constructed by adding information collected on a wide range of food items in the surveys, taking care to supplement reported food expenditure with reported food produced for own consumption.⁹ A measure of adult equivalent household food consumption was computed taking children aged 14 or below at 0.73 of an adult, in line with equivalence scales used for Mexico (Teruel, Rubalcava and Santana, 2005). This is the food consumption outcome variable used.

Assets measures include are land and livestock which seem especially appropriate to communities in rural Mexico. Two measures of land tenure were constructed: a binary measure of whether households owned or used land for agricultural purposes,¹⁰ and a continuous measure of the hectares owned/used in the largest five plots. Four measures of livestock were constructed, focusing on two separate types of livestock. Production livestock includes poultry, pigs, goats, and cows, which as their label indicates produce milk, cheese, meat, etc. Draft livestock includes horses, mules, oxen, etc, which use is primarily to assist in farming or transport. Two livestock variables constructed are binary measures of whether households have production or draft livestock. A further two variables provide a continuous measure of the number of production or draft livestock measured in cow equivalents using a conversion table constructed from information on livestock values in rural Mexico (Gertler, Martinez and Rubio-Codina, 2005).

Household food consumption

The section begins by reporting on the cross section estimations of the model in equation (2) with adult equivalent food consumption as the independent variable.

Table 1 below provides OLS regression estimates.

⁹ Where only quantity of food purchased or consumed was reported, a monetary value was imputed using median prices.

¹⁰ The actual question in the survey instrument asks: how many plots of agricultural, livestock, or forestry land are owned or used by members of the household in the last 12 months? This is followed by questions on the hectares and use of each of these plots, up to 5 in the baseline 1997 Survey.

Table 1: PROGRESA and food consumption of non-eligible households. ols regression estimates (t-statistic).				
	<i>October 1998</i>	<i>May 1999</i>	<i>November 1999</i>	<i>November 2000</i>
Treatment (ITE)	0.011	0.123	0.048	0.022
	(0.51)	(4.05)***	(1.75)*	(1.02)
Poverty Index	0.053	0.073	0.028	0.076
	(2.32)**	(2.40)**	(1.02)	(2.43)**
Shock	-0.010	0.001	-0.052	-0.027
	(0.39)	(0.01)	(1.51)	(0.57)
Number of shocks	0.016	0.002	-0.008	-0.032
	(0.92)	(0.08)	(0.39)	(1.38)
Household income	1.754	0.726	0.327	-0.335
	(7.18)***	(3.56)***	(1.54)	(1.48)
Works status of head	0.124	0.131	0.128	0.087
	(6.03)***	(5.04)***	(4.91)***	(2.88)***
Gender of head	-0.198	-0.154	-0.174	-0.170
	(8.00)***	(4.11)***	(4.90)***	(4.53)***
Age of head	0.008	0.004	0.005	0.004
	(16.59)***	(6.25)***	(7.67)***	(4.86)***
Land holding in 1997	-0.000	-0.001	0.000	-0.000
	(0.26)	(1.68)*	(1.20)	(0.26)
Spanish and native dialect	-0.116	-0.054	-0.112	-0.067
	(5.77)***	(1.83)*	(4.30)***	(2.22)**
Native dialect only	-0.165	-0.163	-0.007	-0.080
	(3.00)***	(1.88)*	(0.08)	(0.91)
Community marginalisation	-0.073	0.031	0.032	0.030
	(3.04)***	(1.00)	(1.12)	(0.92)
# of hhs in locality	-0.000	0.000	-0.000	-0.001
	(0.65)	(0.59)	(0.87)	(1.01)
# of treated hh in locality	-0.001	-0.002	0.001	-0.000
	(1.93)*	(2.05)**	(1.20)	(0.07)
Hidalgo	0.219	0.220	0.254	0.281
	(4.22)***	(3.99)***	(4.97)***	(4.64)***
Michoacan	0.193	0.280	0.319	0.210
	(3.73)***	(4.84)***	(6.24)***	(3.25)***
Puebla	0.063	0.152	0.206	0.094
	(1.22)	(2.91)***	(4.26)***	(1.53)
Queretaro	-0.009	0.069	0.052	-0.036
	(0.16)	(1.09)	(0.95)	(0.50)
San Luis de Potosi	0.114	0.039	0.203	0.443
	(2.26)**	(0.74)	(4.19)***	(7.23)***
Veracruz	0.068	0.254	0.211	0.257
	(1.35)	(4.69)***	(4.35)***	(4.21)***
Constant	3.458	2.904	2.927	3.063
	(28.58)***	(18.84)***	(19.89)***	(17.73)***
Observations	9107	4367	4459	3715
F test: Bi=0	34.00	11.88	11.39	13.85

Notes: Robust t statistics in parentheses. Asterisks *, **, *** indicate statistical significance at 10%; 5%; and 1%, respectively.

The regression includes a number of characteristics measured at the individual, household and community levels (Appendix One, Table A2, shows descriptive statistics by treatment and control areas for explanatory variables used in the analysis). Individual characteristics include age, gender, language and work status reported for the head of the household. Household-level variables include household income and land holdings, measured in the 1997 ENCASEH survey to control for initial conditions; and the incidence and number of shocks affecting the household in the last year. The poverty index variable indicates household rankings from the proxy means test used to identify eligible households.¹¹ Community level variables include the number of households and the number of treated households in each community. The marginalisation index ranks communities according to indicators of deprivation.¹² Finally, state dummies are included to capture regional variation.

The variable of interest is *treatment*, which parameter provides an estimate of the indirect treatment effects of PROGRESA for household consumption on non-eligible households across four periods of data. The results indicate that food consumption among non-eligible households' in treatment areas is not significantly different than among non-eligible households in control areas for October 1998. The lack of significance is expected and is likely to reflect the fact that at this point PROGRESA was in its initial stages of implementation. For May 1999 and November 1999 food consumption is significantly higher for non-eligible household living in treatment areas, compared to non-eligible households in control areas. By November 2000 all eligible households in the sample are now receiving transfers, and as expected differences in food consumption, when using the control/treatment areas identification from 1999, are not significant.

Overall we interpret these results to indicate that we cannot rule out significant spillover effects on non-eligible households living in treatment areas. The effects of PROGRESA on non-eligible households are not apparent initially, in the October 1998 round, but they are significant in the next two rounds of data.¹³ The estimates show that household consumption among non eligible households in treatment areas was about 12 percent higher in May 1999 than among those in control areas, and 4.5 percent higher in November 1999 (the parameter for the May round is significant at the 1% level whereas

¹¹ This is the score from a discriminant analysis of non-income variables determining well-being and poverty (Skoufias, Davis and de la Vega, 2001).

¹² This is constructed from a principal components analysis of seven variables: share of illiterate adults, share of dwellings without water, without electricity, without drainage, average number of occupants per room, share of dwellings with dirt floor, share of population working in primary sector (Skoufias, Davis and de la Vega, 2001).

¹³ This finding appears to confirm the observation in Handa, Huerta, Perez et al. et al. (2000) that spill-over effects take time to manifest themselves.

the parameter for the November round is significant at the 10% level). The effect appears to diminish once all areas become part of the programme.¹⁴

To further verify the above findings we estimated a fixed effects model described in equation (3). Results presented in Table 2 below confirm the findings from the cross section estimation. The parameters on the *Period* variables indicate a decline in consumption across all households in May 1999 as compared to October 1998, with a recovery such that by November 2000 there is no significant difference in consumption between the this period and October 1998.

The parameters on the interaction between treatment areas and time show that a positive and significant difference in food consumption exists between households living in a treatment areas as opposed to non-treatment areas for the May 1999 and November 1999 data rounds. In particular, the parameters on the *May 1999*Treatment* and *November 1999*Treatment* indicate that food consumption among non-eligible households in treatment areas was significantly higher compared to food consumption among non-eligible households in control areas. The results also indicate that this effect is extinguished by the November 2000 data round.

Table 2: PROGRESA and food consumption of non-eligible households. Fixed effects regression estimates (standard errors).	
Variable	Parameter (s.e).
Number of shocks	-.0084** (.0035)
Shock	.01423 (.0100)
Work status of head	.03089** (.0120)
PERIOD	
May 1999	-.1138** (.0139)
November 1999	-.0668** (.0136)
November 2000	.0238 (.0268)
October 1998	(dropped)
Period interacted with Treatment	
May 1999 : Treatment	.0758** (.0177)
May 1999 & November 1999 : Treatment	.0825** (.0174)
May 1999 & November 1999 : Treatment (measured in 2000)	.0214 (.0186)
Constant	5.099 (.0114)
Notes: Robust standard errors in parentheses. Asterisks *, **, *** indicate statistical significance at 10%; 5%; and 1%, respectively. Number of observations = 23,918. R-squared within observations = 0.0089 and between observations = 0.0007. F (9, 12,678) = 12.60 (significant at 1% level).	

¹⁴ We tested for the robustness of these findings. We ran the same models eliminating consumption outliers, and we also re-estimated the equations using consumption values rather than logs. The sign and significance of the parameters were unchanged.

In sum, both the cross-section and the fixed effects OLS estimates confirm that following the introduction of PROGRESA in 1997, food consumption among non-eligible households in treatment areas was significantly higher than among non-eligible households in control areas. These findings are interpreted to indicate the presence of strategic complementarities from social transfers.

Assets

The presence of strategic complementarities arising from social transfers would be consistent with changes in the assets of non-eligible households in treatment areas compared to similar households in control areas.¹⁵ This can be checked by running equation (3) with asset measures as the outcome variable. Table 3 below reports on random effects PROBIT estimation using hectare use, the number of draft animals in cow equivalent, and the number of production animals in cow equivalent; and random effects PROBIT estimation using land and livestock ownership.

Table 3: PROGRESA and asset holdings among non-eligible households. random effects estimates (t-statistic).					
	<i>Hectare Use</i>	<i>Land Ownership</i>	<i>Production Animals</i>	<i>Draft Animals</i>	<i>Livestock Ownership</i>
Period May 99	-1.735 (6.24)***	-0.365 (14.12)***	-0.230 (4.78)***	-0.209 (6.75)***	-0.220 (8.63)***
Period November 99	1.765 (6.58)***	0.142 (5.55)***	-0.142 (3.01)***	-0.110 (3.66)***	-0.103 (4.08)***
Period November 00	4.694 (16.64)***	0.280 (10.59)***	--	--	--
May 99 : Treatment	0.501 (1.76)*	0.051 (1.85)*	0.094 (1.83)*	0.084 (2.61)***	0.107 (4.04)***
May 99 & Nov 99 : Treatment	0.353 (1.29)	0.082 (2.96)***	0.205 (4.01)***	0.033 (1.06)	0.167 (6.23)***
May 99 & Nov 99 : Treatment (measured in 00)	0.277 (0.291)	0.097 (0.029)***	--	--	--
Constant	-11.190 (9.99)***	-0.553 (3.93)***	0.194 (0.67)	-1.605 (10.14)***	0.010 (0.07)
Observations	59623	58911	43834	43835	43859
Individuals	18270	18239	18065	18065	18075
χ^2 Test: Bi=0	2002.06	3886.11	796.82	1730.71	633.72
σ_{vi}	1.96	0.87	1.79	0.69	0.70
ρ	0.11	0.43	0.33	0.20	0.33
Notes: Robust t statistics in parentheses. Asterisks *, **, *** indicate statistical significance at 10%; 5%; and 1%, respectively. Estimation for hectare use, number of draft animals in cow equivalent, and number of production animals in cow equivalents are based on random effects TOBIT models. Land ownership and animal ownership are random effects PROBIT models.					

¹⁵ The period covered by the data is characterized by structural changes in the rural economy in Mexico, showing a decline in agricultural production. PROGRESA was introduced to mitigate the impact of structural change on the poorest rural households.

The main variables of interest are the interactions of the period and the treatment identifier. Across the table, for all asset measures, the interaction term for May 99 generates positive and significant differences between non-eligible households in treatment areas and similar households in control areas. For some asset measures, hectare use and draft animals, this difference peters out after May 99, and the interaction term loses significance. For the three other asset measures, land ownership, production animals, and livestock ownership, the gap between non-eligible households in treatment and control areas becomes larger and more significant. Non-eligible households in treatment areas have a significantly higher probability of owning land compared to non-eligible households in control areas, with the gap steadily rising from 5.1 percent in May 1999, to 8.2 percent in November 1999, and to 9.7 percent in November 2000. The gap in livestock ownership rises for non-eligible households in treatment areas compared to those in control areas, from 10.7 percent in May 1999 to 16.7 percent in November 1999.

These findings should be interpreted together with the period parameters. The latter show a large decline in all asset measures in May 1999. The hectare use measure shows a recovery in November 1999, which is strengthened in 2000. However, the other asset measures show a partial recovery, land ownership, or continued decline, production and draft animals and livestock ownership. These trends provide the context in which the impact of PROGRESA on non-eligible households is examined. The findings confirm that the introduction of PROGRESA transfers in treatment areas resulted in positive changes in assets for non-eligible households, compared to similar households in control areas. Within a general context of declining production in rural Mexico, non-eligible households in treatment areas appear to have been able to protect their assets better than in control areas.

Cross-section estimates and the distribution of asset effects

Interesting insights into the distribution of the asset effects of PROGRESA are gained by conditioning the treatment effects on initial asset holdings. The treatment effects on assets of non-eligible households are estimated through a version of equation (2) above, the main difference being that the control variables are taken from the 1997 ENCASEH survey which predates the roll on of the programme. These variables control household and community characteristics at the baseline, and include: the number of households in the community/village and whether the community has mains water. Household controls include the age and sex of the head of household, whether s/he is literate, speaks indigenous dialect, the highest grade attended at school by the head, and her/his employment status. The number of rooms in the household is also included as a control variable. Table 4 below reports on the results.

The parameters reported in the Table are mixed, but overall provide a measure of support for the hypothesis that cash transfers have strategic complementarities in rural

communities. The probit models exploring whether households own/use land for agricultural purposes generally identify significant differences between non-eligible households in treatment areas and control areas. Non-eligible households in treatment areas are more likely to own/use land than those in control areas only for the November 1999 and May 2000 rounds. When the probits are run on the full sample, non-eligible households in treatment areas show 3.6 percent higher probability of having land in May 1999, and a 4.2 higher probability in May 2000. Conditioning on not having land in 1997, the baseline year, non-eligible households in treatment areas have a significantly higher likelihood of having land in the follow up surveys, with the marginal effects rising from the October 1998 survey to the May 2000 survey, and declining afterwards. The effects are reversed in direction when the sample is restricted to those having land in 1997, with non-eligible households in treatment areas showing a lower likelihood of having land compared to non-eligible households in control areas. Overall, we interpret these results as confirming that social transfers are associated with higher asset holdings among non-eligible households in treatment areas, and suggesting local economy effects of transfers on the local economy. It is particularly noteworthy that the effects are stronger among non-eligible households without land prior to the programme, which would seem to indicate that the interdependencies are concentrated among this group.

<i>Asset variable</i>	<i>October1998</i>	<i>May1999</i>	<i>November1999</i>	<i>May2000</i>	<i>November2000</i>
Land (yes=1; no=0)	-0.003	0.006	0.036*	0.042*	0.009
Land (yes=1; no=0); conditioned on no land in 1997	0.052	0.031**	0.048*	0.081*	0.036**
Land (yes=1; no=0); conditioned on land owned/used in 1997	-0.020***	-0.022***	0.007	-0.002	-0.028*
Livestock (yes=1; no=0)	0.006	0.027*	0.037*	0.019*	
Livestock (yes=1; no=0); conditioned on having no livestock in 1997	0.022**	0.025**	0.055*	0.024**	
Livestock (yes=1; no=0); conditioned on having livestock in 1997	-0.019**	0.014	0.004	0.005	
Notes: * significant at 1%; ** significant at 5%; *** significant at 10%. All models include household and community controls measured at their 1997 baseline values: number of households in village, whether village has mains water; head of household age, sex, literacy, top grade attended at school, whether speaks indigenous dialect, and employment status; number of rooms in household.					

Similar results apply to probits exploring whether non-eligible households in treatment areas are more likely to have any form of livestock than those in control areas. The marginal effects associated with the treatment identifier are, with one exception, significant, rising to November 1999 and then falling. The marginal effects are again stronger when the sample is restricted to those with no livestock in 1997. Conditioning on households which had livestock in 1997, the effects lose significance. These results are again consistent with the presence of increased productive interaction between agents resulting from the cash transfers, and these are stronger for households lacking agricultural assets prior to the roll on of the programme.

5. How do social transfers facilitate strategic complementarities?

The findings presented in the paper suggest that social transfers have effects beyond the direct improvement of the welfare of beneficiary households. They confirm that, following the introduction of PROGRESA, household food consumption and asset holdings of non-eligible households in treatment areas are significantly higher than those observed among non-eligible households in control areas. We interpret our results as consistent with the presence of local economy effects of social transfers. While the analysis confirms the incidence of these effects, it does not illuminate on the potential channels and processes through which the local economy effects of social transfers work. Yet, these are extremely important not only in terms of the plausibility of our interpretation of the findings, but also in a policy context. This section brings together findings from the emerging literature on PROGRESA to map out what is known about the potential processes supporting these effects.

The impact of transfers on effective demand is confirmed by several studies. They confirm that households in rural Mexico spend the larger part of their transfers. PROGRESA transfers have been estimated to represent on average 20 percent of pre-programme household consumption, while the mean rise in the consumption of beneficiary households has been estimated at around 14.5 percent (Hoddinott, Skoufias and Washburn, 2000; Hoddinott and Skoufias, 2004). Gertler, Martinez and Rubio-Codina (2005) extract measures of the marginal propensity to consume from PROGRESA transfers and conclude that, on average, eligible households consume three quarters of their transfers, and save or invest the remaining quarter. Among poorer households, those without agricultural assets in the pre-programme stage, they estimate a marginal propensity to consume at 0.961. The introduction of PROGRESA led to a rise in effective demand.

In the context of rural Mexico, the supply response to this rise in effective demand will involve a mix of a rise in beneficiary households' production for own consumption and a rise in production for sale by eligible and non-eligible households. We could speculate that if the bulk of the rise in demand is met by production for own consumption, prices of

consumption goods will be unaffected. Similarly, wages will be unaffected. If on the other hand the bulk of the supply response comes from production for sale by eligible and non-eligible households, we could expect observable changes in prices, labour supply and wages.

The findings from several sources indicate that beneficiary households stepped up production, with a consequent rise in the use of agricultural assets and investment in associated materials and equipment (Gertler, Martinez and Rubio-Codina, 2005; Angelucci and De Giorgi, 2006). However, there is no evidence of a significant change in labour earnings or hours of work (Parker and Skoufias, 2000). A reduction of child labour in response to the conditional cash transfer appears to have been compensated for by a marginal rise in adult labour. Moreover, labour earnings and aggregate hours of work are not significantly different across treatment and control areas, and over time. There is no evidence of a significant change in food prices (Hoddinott, Skoufias and Washburn, 2000), suggesting that whatever the fraction of the increase in consumption that was absorbed through market demand, there was sufficient unused capacity to meet this rise in demand without any impact on prices. Deteriorating economic conditions in rural Mexico can easily account for the presence of unused capacity.¹⁶ These findings would suggest a muted market supply response.

Examining the potential contribution of non-eligible households is crucial to closing this loop, but also elusive. Gertler, Martinez and Rubio-Codina (2005) check for the presence of community level income effects by comparing differences in assets of non-eligible households across treatment and control areas in a panel including data from October 1998, May 1999 and November 1999, and they find that “there are no significant program impacts for the sub-sample of ineligibles, the exception being an increase in the number of draft animals for big farms” (p.15). The results reported in this paper diverge directly from the latter. We do find some support for the hypothesis that there are ‘production’ effects of the introduction of PROGRESA among non-eligible households.¹⁷ Our findings are consistent with the possibility that the rise in demand absorbed by the market was met mainly by increases in production among small producers with low asset holdings. This would also help explain why the impact of PROGRESA transfers on the local economy did not fully register in more formal markets, through changes in prices or labour utilisation.

This point also helps with a related question: what are the sources for the increase in consumption among non-eligible households? Angelucci and De Giorgi argue that these

¹⁶ Angelucci and De Giorgi (2006) test for differences in sales of agricultural produce and livestock in October 1998 and agricultural sales in May 1999, but find that sales are lower in treatment areas compared to control areas both among eligible and non-eligible households.

¹⁷ We also find that these effects are stronger for non-eligible households with low asset holdings prior to the programme, although this work is not included in this paper for reasons of space. These findings emerge from conditioning asset measures on land and livestock ownership in 1997.

are explained in part by reductions in precautionary saving (reductions in saving and in liquid assets, mainly livestock) following the introduction of PROGRESA. Angelucci and De Giorgi (2006) suggest the increase in consumption among non-eligible households reflects a reduction in precautionary saving brought about by improved informal networks of insurance and protection. It is not clear how far this explanation would go, as rough measures of precautionary savings do not come close to covering the estimated increase in food consumption among non-eligible households we report above. The behavioural processes explaining the reduction in precautionary saving are also cloudy. One possible explanation is a 'demonstration effect', with non-eligible households replicating the consumption behaviour of eligible households (keeping up with the 'poor' Joneses?)(Handa, Huerta, Perez et al., 2000).

An alternative explanation points to the potential role of equivalent (compensating) transactions through private transfers (Davies and Teruel, 2000). It is possible that beneficiary households shared their transfer income with non-eligible households thus raising effective demand of the latter. Alternatively, non-eligible households may have responded to the cash transfer by withdrawing private transfers to eligible households. While these may be contributory explanations, these channels are too narrow to account for the rise in consumption among non-eligible households. There is some evidence on crowding out of private transfers, but their incidence is likely to be low as only 7 percent of households in a single data round report receiving private transfers (Albarran and Attanasio, 2002). There is also some evidence of private transfers (including from eligible to non-eligible households) responding to shocks in treatment areas (Angelucci and De Giorgi, 2006). Again the incidence is very low, only 58 households received transfers when affected by shocks (Angelucci and De Giorgi, 2006).¹⁸ Another potential compensating effect could come from public transfers other than PROGRESA. For example, if other public transfers are now redirected to less poor households, this could lead to increased consumption among non-eligible households. However, Angelucci and De Giorgi (2006) find there is no significant difference in the value or incidence of other public transfers between treatment and control areas.

Further work is needed to pinpoint with greater precision the channels and processes linking transfers to local economic effects. Piecing together findings from the merging literature on PROGRESA suggests that supply responses in the main did not operate through formal markets. This is because of deterioration in economic conditions in rural Mexico, which added to unused capacity, and the likelihood that the impact of transfers on non-eligible households was stronger among those with a low asset base before the implementation of the programme. Further research is needed to assess the strength of these explanations.

¹⁸ There is very little work on potential effects of remittances in compounding or compensating for PROGRESA transfers.

Conclusions

The paper examined local economy effects of social transfers, by focusing on food consumption and asset holdings of non-eligible households in rural Mexico following the introduction of PROGRESA. The quasi-experimental nature of the evaluation data collected for the purposes of evaluating the impact of PROGRESA enables the quantification of this impact. In the paper we compare welfare indicators among non-eligible households in treatment areas and control areas. It is postulated that the presence of local economy effects of cash transfers is consistent with improvements in household consumption and asset holdings by non-eligible households in treatment areas, compared to similar households in control areas. It is very likely that this improvement works through the heightened level of interdependency and complementarities between beneficiaries and non-beneficiaries as a result of the transfer.

While on average households in rural Mexico experienced lower consumption and asset holdings over the initial periods of PROGRESA due to conditions in the Mexican economy, we find that non-eligible households in treatment areas have significantly higher household consumption than similar households in control areas in the two years after the introduction of PROGRESA. We also find evidence that asset holdings among non-eligible households in treatment areas are significantly higher than non-eligible households in control areas. The results suggest that household food consumption among non-eligible households in treatment areas was 12.3 percent higher in May 1999 compared to non-eligible households in control areas, and 4.8 percent higher in November 1999. As regards asset holdings, the probability of land ownership was 5.1 percent higher in May 1999 for non-eligible households in treatment areas compared to non-eligible households in control areas, and 8.2 percent higher in November 1999. The probability of livestock ownership was 9.1 percent higher in May 1999 for non-eligible households in treatment areas compared to similar households in control areas, 10.7 percent in November 1999 and 16.7 percent in November 2000. Asset holdings effects are stronger for non-eligible households with a low asset base before the introduction of PROGRESA. We interpret these results as providing supportive evidence for the presence of strategic complementarities arising from social transfers in Mexico.

Tracing the channels and processes through which the effects of transfers on the local economy work operate is a harder task for analysis of this type. The paper mapped the findings from available studies to explore this issue. There is strong evidence of the impact of PROGRESA transfers in raising effective demand among beneficiaries, but little evidence on this impact on formal markets. This could be accounted for by the fact that the introduction of PROGRESA was a response to the deterioration in economic conditions in rural Mexico, adding to unused capacity, and that the impact among non-

beneficiaries was stronger among those with low initial asset base. It is unlikely that the higher food consumption observed for non-eligible households in treatment areas could be fully accounted for by reductions in precautionary savings or equivalent transactions through private transfers. The findings from available studies do not rule out the strong likelihood that the gap in food consumption observed for non-eligible households in treatments areas and control areas was supported by local economy effects of social transfers.

Some caveats need to be made in relation to our findings. First, our study could not account for the range of factors outside the PROGRESA programme that could have influenced the results presented above. For instance, the presence of fluid credit and labour markets, dynamic land markets, and thick food markets that enable fast supply response, could be important to ensuring transfer programmes have positive and significant effects upon the local economy. Furthermore, as mentioned above, other policies enacted within the time period of our study may have reinforced, or dampened, the results described in the paper. To the extent that these factors are important, great care must be taken when considering our findings.

The findings from this paper, and the literature it reviews, have important implications for our understanding of the impact of social transfers in poor communities. They imply that social transfer programmes are able to achieve much more than to raise welfare among direct beneficiaries. They are also capable of promoting and encouraging wider growth effects among non-eligible groups and the local economy. Further research could productively focus on measuring the size of these effects and identify with greater precision the possible channels and timing of diffusion processes.

Appendix One: Description of main variables

Variable Name	Description of Variable	Unit	Average (S.D.) in Treatment areas	Average (S.D.) in control areas
Food consumption	Log of value of total food consumption	#	5.15 (0.57)	5.07 (0.55)
Hectare use	Hectares owned/used in the largest five plots	#	2.02 (12.33)	2.04 (12.33)
Land Ownership	Whether the household own or use land for agricultural purposes	0/1	0.62 (0.48)	0.60 (0.49)
Production animals	Production livestock includes poultry, pigs, goats, and cows	#	1.26 (3.32)	1.19 (2.92)
Draft animals	Draft livestock includes horses, mules, oxen, etc.	#	0.26 (3.47)	0.18 (2.00)
Livestock ownership	Whether the household own livestock	0/1	0.77 (0.42)	0.74 (0.44)

Variable Name	Description of Variable	Unit	Average (S.D.) in Treatment areas	Average (S.D.) in control areas
Poverty Index	Discriminant score from a range of non-income variables used to identify eligible households	#	0.48 (0.74)	0.54 (0.77)
Shock	Indicates whether the household has experienced a shock in the last year	0/1	0.33 (0.47)	0.34 (0.47)
Number of Shocks	Indicates the number of shocks experienced by the household in the last year	#	0.42 (0.72)	0.43 (0.74)
Household income (1997)	Household monthly income/10000 (from 1997 dataset)	#	1,050 (1,292)	1,124 (1,348)
Work status of head	Indicates whether the head of household is employed	0/1	0.84 (0.37)	0.83 (0.37)
Gender of head	Indicated the sex of the household head	0/1	0.89 (0.31)	0.89 (0.31)
Age of head	Indicates the age of the household head	Years	46.67 (15.96)	47.33 (16.18)
Land	The amount of land owned by the household in 1997	Hct	4.28 (20.38)	5.39 (26.42)
Spanish and native dialect	Whether household speaks both Spanish and native dialect	0/1	0.35 (0.48)	0.35 (0.48)
Native dialect only	Whether household speaks native dialect only	0/1	0.04 (0.20)	0.05 (0.21)
Community marginalisation	Community marginalisation index	#	4.68 (0.47)	4.67 (0.47)
Number of households	Indicates number of households in locality	#	70.66 (49.65)	74.09 (47.19)
Number of treated households	Indicates number of treated households in locality	#	42.41 (33.06)	14.85 (32.22)

Source: PROGRESA. Notes: Other variables included in the analyses are regional controls (Guerrero, Hidalgo, Michoacán, Puebla, Queretaro, San Luis Potosí, Veracruz).

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