Impact of the Pensión 65 social program on spending on food, 2017-2018

JUAN INQUILLA MAMANI
Universidad Nacional del Altiplano
inquilla@hotmail.com

ALFREDO PELAYO CALATAYUD MENDOZA
Universidad Nacional del Altiplano
alfredopelayo@yahoo.com

Abstract. The objective of this article is to estimate the impact of the Pension 65 social program on per capita expenditures on food. The study is based on a quantitative methodological perspective, using the differences-in-differences technique with propensity score matching (DD-PSM). For this purpose, the database of the 2017-2018 National Household Survey (ENAHO) is used, both for the treatment and the control group. The units of analysis are Peruvian households at the national level that participated in the program for two consecutive years, with 2017 as the baseline. The results obtained indicate that per capita expenditure on food has increased by 15.02% for those households that receive the Pensión 65 program.

Keywords: Pensión 65; consumption per capita; food consumption; double difference method; social programmes; Peru.

Introduction

One of the aims of Peru's public pension program, Pensión 65, is to help improve the wellbeing of individuals over 65 years of age who are in extreme poverty, as classified by the country's Household Targeting System (Sistema de Focalización de Hogares, SISFOH). In general terms, public policies should prioritize actions that cater to a target population group based on well-established selection criteria. In this context, Pensión 65 assists vulnerable individuals by disbursing a pension of 250 soles to each beneficiary every second month.

In its impact assessment of Pensión 65, the Office of Public Spending Quality under the Ministry of the Economy and Finances (Dirección de Calidad del Gasto Público del Ministerio de Economía y Finanzas, 2015) concluded that three years on from its implementation, the program had reduced the proportion of people over 65 engaged in paid employment; this equated to a 9% drop in the number of people in this age group working out of economic necessity and, thus, a 22% decline in average labor income. Meanwhile, monthly per capita household consumption rose by 40%; of this increase, 66% was used to obtain food and 34% was used for other expenses, thus helping to alleviate vulnerability in the short term. Along similar lines, other studies point to a reduction in the number of hours worked and an increase in hours spent on leisure or other activities (Galiani, Gertler, & Bando, 2014; Torres & Salinas, 2016; Gondim Teixeira, 2009; Durán Valverde, Mendoza De Souza, & Picado Chacón, 2009).

On the other hand, empirical researchers have found evidence that non-contributory pensions have a negative effect in one way or another on the labor supply of beneficiaries. In the case of Mexico, assessments of the "70 y Más" program, for instance, note a reduction in the number of seniors in paid employment (Galiani & Gertler, 2012), and observe that the program has prompted an increase in social well-being among seniors whose labor supply did not decrease (Galiani *et al.*, 2014). Finally, other authors (Edmonds, 2006; Carvalho F., 2012; Barrientos, 2003; Barrientos & Lloyd-Sherlock, 2002) conclude that non-contributory pension policies can not only improve household well-being through an increase in leisure hours or presence in the household, but can also be considered as a means of reducing household vulnerability.

Another notable study is that of Teixeira (2008), which shows that cash transfers disbursed under Brazil's Bolsa Família program resulted in a small decrease in the number of labor hours. The study finds this reduction to be statistically significant, but not large, with a variation between 0.5 and 3.5 hours per week for adults who work. The greater the proportion of house-

hold income that the transfer represents, the greater the effect. Individuals who are below the extreme poverty threshold reduce their labor supply to a greater degree than those below the poverty threshold. Moreover, households in which there is only one child, or those that receive 15, 50 or 65 Brazilian reals, reduce their labor supply for paid work to a greater extent than do bigger families.

According to Bosch and Guajardo (2012, quoted by Torres and Salinas, 2016), as a result of a similar program in Argentina there was a drop in the participation of pensioners in the labor force. Many beneficiaries opt to stop working and there was a greater fall in the self-employed labor supply of men and the formally employed labor supply of women. Moreover, many beneficiaries who continue working do so in the informal sector. According to a study by Berniell (2014), Argentina's pension reform has had a positive effect on the permanent income of women and on their contribution to household income. Because of this increase, household roles have become more equal.

For the Peruvian case, Aramburú and Rodríguez (2011) find that between 2004 and 2009, poverty fell by 28.2% nationwide; however, in the same period, inequality in income distribution dipped only slightly, from 0.49 to 0.48, according to the Gini coefficient. The improvement in income distribution requires "pro-poor" tax and growth policies and greater efforts to improve access for low-income households to public goods and services. Reducing inequality is fundamental for a more cohesive society. As such, targeted programs for combating extreme poverty must concentrate on rural parts of the Andes and Amazonia.

Extreme poverty presents greater regional differences than does poverty in general: it is almost 149 times higher among the rural population than in Lima, and thirteen times higher in the Andes and nine times greater in Amazonia than on the coast. However, very few impact assessments of consumption have focused on spending per capita on food in Peru. Thus, the aim of this study is to estimate the impact of the Pensión 65 program on this form of per-capita spending. To this end, the 2017-2018 National Household survey (Encuesta Nacional de Hogares, ENAHO) is used to identify direct program beneficiaries (treatment group) and to construct a comparison group using the difference-in-difference method with minimum least squares, and fixed effects (FE) with panel data. The units of analysis are Peruvian households that participated in this social program for two consecutive years, and 2017 was taken as the baseline.

The econometric analysis involves estimation of the difference-in-difference model with propensity score matching (DD-PSM) using panel

data from ENAHO 2017-2018. The article is organized as follows: the introduction discusses the problematic of Pensión 65's activities, as well as theoretical and methodological antecedents across the different contexts within the field of study. The second section describes the methodological process used for the data treatment and the estimations performed to determine the impact. The third section presents the results and discusses the impact of Pensión 65 and beneficiaries' per-capita spending on food. The final section concludes.

1. Methods and materials

In the literature on impact assessment, various quantitative methods are used to tackle the problem of non-randomness in social-program treatment and control groups. The choice of a method depends on its relevance to public policy aimed at a particular target group—such as adults over 65 years of age, as in the case of Pensión 65 (Angrist & Pischke, 2008). This study uses two variations of the classical differences-in-differences method in order to define control groups and, in turn, determine the difference in per-capita food spending between both groups. Given the nature of the data, especially that relating to per-capita food spending per user, the approximations are estimated using ordinary least squares with FE.

The main source of information used in this study is the ENAHO, conducted each year by the National Institute of Statistics and Informatics (Instituto Nacional de Estadística e Informática, INEI). This survey is representative at the level of Peruvian departments and contains data on hours worked, employment status, education, participation in social programs, housing materials, access to basic utilities, among others, which is necessary for the regression analysis.

Sample

The treatment group sample includes those households with just one beneficiary, and those in which no other members participate in non-food programs. In turn, the control group is made up of those households whose members are not involved in any non-food programs (see Table 1). The final sample includes two-year panel-data households (2017-2018).

Table 1
Requirements for inclusion in the treatment or control group

Treatment group	Control group
At the household level, the individual participates solely in the Pensión 65 program, and not in any other non-food programs.	No household members participate in any non-food programs.
The household has just one beneficiary aged 65 years or over.	The head of household living in extreme poverty or poverty in general.

Econometric model for estimating impact using panel data

Applying Ravallion's (2007) and Rosenbaum and Rubin's (1983) quasi-experimental methodology, this study identifies the group of households that receive cash transfers (treatment group), denoted by PENSION=1, and the group of households of similar characteristics that do not receive transfers (PENSION=0). Following Zegarra (2015) and Shahidur *et al.* (2010), when the econometric model is based on panel data, to measure impact, the following specification is used for each household in each period *t*:

$$LGASTO_{it} = a + b_1 * PENSION65_i + b_2 * PENSION65_i A\tilde{n}o + b_3 A\tilde{n}o + \gamma X_i + \varepsilon_{it}$$

Where: LGASTO is the logarithm of spending on food and X_i is the vector of observable characteristics that make each household or senior different. Moreover, the specification is applicable to two time periods: the household is the so-called "baseline" in year 0; while in year 2 the household falls within the "impact measurement" period. The variable PENSION has the value of 1 if a household is treated (both at the baseline and during subsequent measurement), and the value of 0 if a household is untreated (again at the baseline and during subsequent measurement). The coefficients b_1, b_2 and b_3 are crucial for understanding the dynamics of the effects. The first coefficient, b_1, measures the mean value of the difference between treated and untreated households at the baseline. On the other hand, the coefficient b_3 measures the change in the variable of impact between the baseline and the subsequent measurement for all households. Finally, b_2 measures the DD of the program on the dependent variable; that is, it measures the impact of treatment on those treated by the program, which is equivalent to impact ΔY. The model can be estimated using FE with propensity score matching (PSM).

2. Analysis of results

This section presents the results of the estimations of the impact of the Pension 65 program on spending per capita on food. First, the results of the

estimations using the DD-PSM model with FE per cluster are discussed. Then, the consistency of the results are discussed—on this point, it is unlikely that the changes will be a consequence of an unobserved heterogeneity between the two groups. The effects of the general average treatment are greater in magnitude, but not statistically different than the intention-to-treat estimations in relation to program participants. In summary, the results are compared with the inclusion of certain covariables. At the individual level, the covariables include poverty status, age, years of education, access to potable water, unmet basic needs, and classification of area of residence (urban/rural).

Identification of the treatment and control group

This section describes the method of identifying the treatment and control groups in order to assess the program's effects on users. The main empirical challenge lay in creating a group that could model the effects of non-participation on users. To this end, the exogenous variation proposed by the eligibility threshold was employed: an individual was eligible only if their score was below this threshold (which varied across the 15 clusters in the sample). Then, the effect of local average treatment was estimated; the results of individuals with scores just below the threshold were compared with those whose scores were just above; and the impacts estimated by introducing fixed effects per cluster. This may seem unnecessary since all thresholds fall within the range of 0.3 standard deviations of the SISFOH score. However, FEs per cluster are relevant to this model for two reasons. First, they model the geographical differences that may exist within the cluster. Second, they allow for a more efficient estimation.

The ENAHO database reports the list of beneficiaries of non-food programs, and also shows the number of beneficiaries per household. Table 2 shows those households that have one, two, and even three member beneficiaries. There it can be observed that 20.35% of households in the sample had two beneficiaries in 2017; however, for the purposes of identifying the treatment group, households with more than two beneficiaries are not taken into account.

Table 2
Households with one, two, three, and four members who are beneficiaries of Pensión 65

Beneficiaries	2017		2018	
	Households	%	Households	%
1	2,393	79.55	2,863	81.10
2	612	20.35	665	18.84
3	3	0.10	1	0.03
4	--		1	0.03
Total	3,008	100	3,530	100

Source: compiled by authors based on data from the 2017-2018 ENAHO.

The ENAHO database reports information on social programs at household level. It allows us to identify the households that are beneficiaries of non-food programs. In the treatment group in this study, those households that benefit simultaneously from various social programs are excluded (Pensión 65, Juntos, Beca 18, etc.). Only those that receive Pensión 65 are included. Table 3 shows that a total of 2,006 households were Pensión 65 beneficiaries, representing 49.37% of the sample. The control group includes those adults whose household is classified as being in poverty, and which has unmet basic needs (UBN).

Table 3
Treatment and control group

Households	2017		2018	
	Number	%	Number	%
Control	1,893	54.81	2,057	50.63
Treatment	1,561	45.19	2,006	49.37
Total	3,454	100	4,063	100

Source: compiled by authors based on data from the 2017-2018 ENAHO.

Descriptive statistics of per capita monthly food spending: 2017-2018

According to the technical specifications of the budgetary program design, the expected outcome of Pensión 65 is to provide economic security to its beneficiaries—individuals over the age of 65 in extreme poverty—so that they can improve their well-being. The specific outcome indicators provide

information on seniors' labor force participation, the number of hours they work, increased access to healthcare services, and average household spending per capita. Table 4 sets out the results of the statistical comparison employing the logarithm of monthly food spending per capita (LGASTO) between the group of Pensión 65 affiliates (treatment) and the group of non-affiliates (control). Specifically, for 2018, average LGASTO in the treatment group is 4.168, while in the case of the control group, it is 4,507—a difference of 0.038, or 33.8%. Utilizing the statistic of *t*, the null hypothesis (Ho) that the averages are equal to a significance level of 5% is rejected; that is, there are significant differences in spending per capita between the two groups.

Similarly, for 2017 there are significant differences in average spending per capita (LGASTO) between both groups (treatment and control). On the other hand, if spending per capita between 2017 and 2018 is compared within the group of program affiliates, the effect of Pensión 65 on average spending per capita for older adults is positive and significant with a 95% confidence interval. Thus, being a program beneficiary increases average spending per capita by approximately 1.9%. Likewise, if average spending per capita over this same period is compared with the control group (non-affiliates), spending per capita increases by just 0.4%. An important result is DD between 2017 and 2018: (-0.023). According to the DD model, spending per capita on food fell by 2.3% during the period analyzed.

Table 4

Difference in the average between the treatment and control groups of households

		ENAHO 2017 [1]	ENAHO 2018 [2]	Difference [2]-[1]
(a) Affiliated with Pensión 65		4.149	4.168	0.019
	n	1,893	2,057	
(a) Not affiliated with Pensión 65		4.511	4.507	0.004
	n	1,561	2,006	
(a)-(b)		0.361***	0.338***	-0.023***
Standard error		0.013	0.024	0.006
T-statistic		13.48	14.03	3.833

Source: compiled by authors based on data from the 2017-2018 ENAHO.
***p<0.01 (denotes significance level of 1%).

Propensity score matching equation

As with the previous estimation using the DD model, it is the interaction between participating in Pensión 65 and being in extreme poverty that is of interest. Thus, the DD-PSM estimation technique entails, first of all,

identifying the observable characteristics or variables pertaining to the individual, household, and dwelling that determine the probability of affiliating with the program. This is achieved by estimating the probit model. Table 5 reports two specifications of the probit model. Specification [1] includes all observable variables, and the signs of the coefficients are as expected, but this specification does not fulfill the assumption of balance and common support. Thus, specification [2] is estimated, in which the signs of the coefficients are as expected and statistically consistent. Moreover, this specification allows the assumption of common support to be achieved [0.0638, 0.9979], while the balance is achieved using the observable variables in five common blocks. Thus, the robustness of the estimation is guaranteed through DD-PSM. It can be inferred from the results that seniors who live in dwellings with UBNs and who belong to poor households are more likely to participate in Pensión 65. Moreover, seniors with fewer years of education and who belong to poor households are also more likely to be affiliated with the program (Figure 1). Meanwhile, seniors without access to potable water and who live in a rural area are more likely to be considered as the Pensión 65 target population.

Figure 1
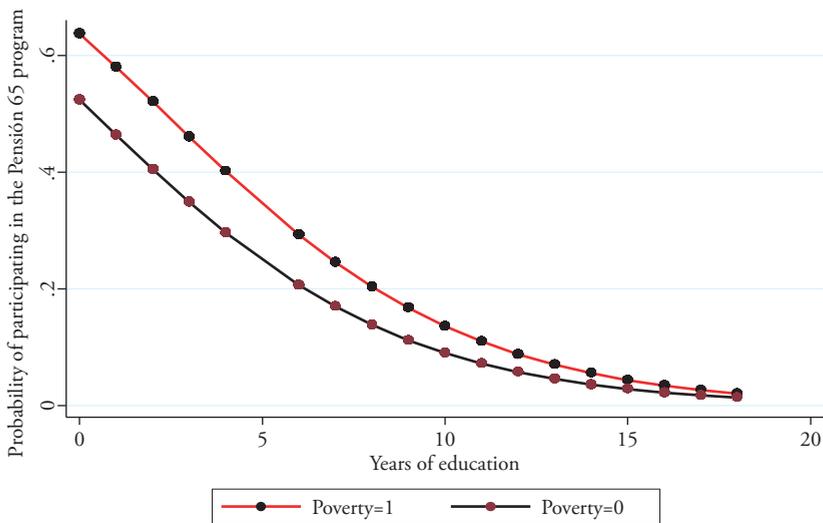Marginal effect of poverty on the probability of participating in Pensión 65

Table 5
Determinants of the probability of affiliating with Pensión 65

Variables	Propensity score equations	
	[1]	[2]
Poverty=1	0.26783**	0.259711**
	(0.10987)	(0.10900)
Years of education	-0.110114***	-0.113003***
	(0.01414)	(0.01409)
Age in years	0.02242***	0.023208***
	(0.00714)	(0.00711)
ubn1	0.743225***	0.780554***
	(0.218168)	(0.21645)
ubn2	1.42011***	1.417726***
	(0.48358)	(0.46895)
ubn3	0.73868***	
	(0.19919)	
ubn4	0.281641	
	(0.85141)	
ubn5	-0.242423	
	(0.81660)	
Potable water=1	-0.65604***	-0.703476***
	(0.12080)	(0.11877)
Urban=1	-0.7451144***	-0.798241***
	(0.13198)	(0.12961)
_cons	-0.812664	-0.739228
	(0.548983)	(0.54548)
Observations	1,068	1,068
Likelihood ratio	369.42	354.97
Pseudo R^2	0.318	0.306

Source: compiled by authors based on data from the 2017-2018 ENAHO.
***p<0.01, **p<0.05 (denote significance levels of 5%, and 10%, respectively).

– **Description of ENAHO panel data**

To measure the changes in the behavior of certain population characteristics, a panel sample was used. These changes refer to pooled cross-sectional time series data. The temporal dimension enriches the data structure, providing data that would not be available without this cross-sectional approach. To wit, as part of the annual ENAHO surveys, the INEI administers a panel subsample; this means that a group of households is also surveyed

the following year, and becomes a panel household sample with two annual observations. Each year a subsample is again randomly selected, independently of the previous one. This method allows the creation of panels of two, three or more years. Table 6 presents an overview of the two-year balanced panel data. The sample size is somewhat small, but the estimation of the impact could be consistent in comparison with the baseline (2017)

Table 6
Two-year panel data

Households	2017-2018	
	Number of observations	%
Control	420	40.94
Treatment	606	59.06
Total	1,026	100

Source: compiled by authors based on data from the 2017-2018 ENAHO.

– **Impact of the Pension 65 program on spending per capita, 2017-2018 panel**

Table 7 shows the estimation of the impact of Pensión 65 using DD, taking 2017 as the baseline. The result, 0.1204, is statistically significant at the 10% level; this implies that spending per capita on food for the group of program affiliates increased by 12.04%. However, this way of measuring impact is only valid provided that program allocation is randomized. But in practice, this is not the case: rather, it is conditional on a set of observable characteristics pertaining to the household and the individual beneficiary. Thus, the program targets beneficiaries by way of SISFOH and takes into account a set of variables, which includes requirements such as living in poverty, having basic unmet needs, being at least 65 years of age, among others.

Table 7
Difference-in-difference with 2017 baseline

	LGASTO
(a) Affiliated with Pensión 65	0.01268
n	308
(a) Not affiliated with Pensión 65	-0.1077
n	205
(a)-(b)	0.1204*
Standard error	0.0695
Statistic t	1.82

Source: compiled by authors based on data from the ENAHO 2017-2018.
*p<0.1 (denotes significance level of 1%).

Table 8 and Figure 1 report the impact estimation of Pensión 65, carried out through estimation of regressions based on the two-period (2017-2018) FE panel data method,[1] taking 2018 as the baseline. On the one hand, the DD technique reports the same result as that obtained in Table 8; that is, the regression coefficient of 0.1204 measures the program impact by assuming that allocation of the benefit is randomized. However, the FE DD estimation technique with clustered standard errors per household is more robust and consistent, because it takes into account the observable characteristics at the moment of disbursing the benefit, by way of the propensity score equation (probit model). This enables a reduction in selection bias in order to compare the final result with common support in [0.0638, 0.9979], while the balance is achieved with observable variables in five common blocks. Moreover, heterogeneity between households is controlled for by including explanatory variables (poverty, years of education, age, UBNs, potable water). Finally, the impact of Pensión 65 on food spending per capita is approximately 15%; this coefficient of impact (b2) is positive and statistically significant at the 10% level; consequently, for the group of program affiliates, household food spending per capita increased by 15%.

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1   These models serve to control for unobservable heterogeneity, particularly when it is consistent over time and correlated with the independent variables. The assumption of the FE model is that the specific individual effect is correlated with the independent variables.

Table 8
Impact of the Pension 65 social program, 2017-2018 panel

LGASTO	DD	DD-PSM
Year	-0.1077**	-0.1148**
	(0.0513)	(0.0556)
PENSION65*Year	0.1204*	0.1502*
	(0.0662)	(0.09079)
Poverty=1		-0.6749
		(0.1228)
Years of education		0.00163
		(0.01672)
Age in years		0.0062
		(0.0075)
NBI1		-0.0558
		(0.1436)
NBI2		0.1020
		(0.1644)
Potable water=1		0.1169
		(0.0914)
Constant	4.4047***	4.2977***
	(0.02293)	(0.5621)
Observations	1,026	599
F	2.26*	7.57***

Notes: Robust clustered standard errors in parentheses.
***p<0.01, **p<0.05, *p<0.1 (denote significance levels of 1 %, 5 % and 10 %, respectively).

In essence, the DD estimation uses both the change in the time of the untreated group and an estimation of the counterfactual for the time change in the treatment group. The key assumption is that without the program, the trend in the two groups would have been the same. This is the common trends, or common parallels, assumption. In the case of Pensión 65, for individuals aged 65 and over, the assumption implies that without additional help, both program affiliates and non-affiliates would have improved their quality of life at the same rate. But it is possible that even in the absence of the program, there would have been an improvement. Figure 2 shows the counterfactual estimation and the impact achieved by the program on the variable studied.

Figure 2
Impact of the Pension 65 program, 2017 baseline
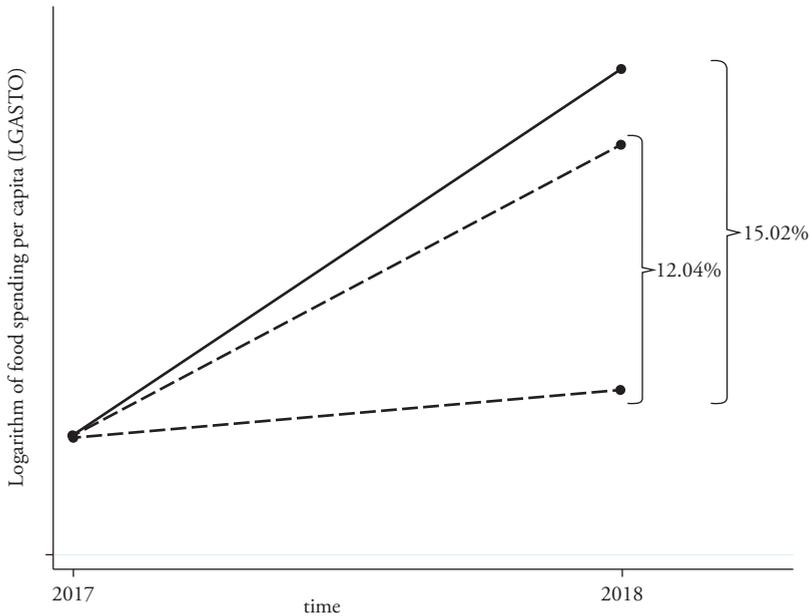
3. Conclusions

The results of this study show that the non-contributory pension disbursed by the Peruvian government (Pensión 65) has led to improvements across some indicators of well-being for beneficiary households, primarily spending on consumption. Likewise, it is logical to infer that in addition to affiliates (individuals aged 65 years and above), other members of the household also benefit through consumption.

The results of the DD-PSM show that the program has a positive impact in terms of an increase in per capita expenditure on food in beneficiary households. Pensión 65 program beneficiaries have increased their spending per capita on food by 15.02%, and the result is statistically significant at the level of 10%. This result implies that the program affiliates are not using most of the pension for priority spending on food. In conclusion, the Pension 65 program has proven effective in improving the social well-being of seniors, mainly through increased household consumption, which contributes in turn to reducing extreme poverty in Peru.

Analysis of the impact of Pensión 65 should not end with the present study, in view of the various complexities of the country's socioeconomic context. As a proposal for future research, new methodologies combining

quantitative and qualitative data should be applied to identify the influence of both conditional and unconditional cash transfer programs on beneficiaries' spending decisions. Another area deserving of study is the presence of factors related to well-being and improvements in the quality of life of program beneficiaries at the national level.

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